THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—23RD YEAR. SYDNEY, SATURDAY, JUNE 13, 1936. No. 24.

Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

ORIGINAL ARTICLES— PAGE.
Aberrant Renal Vessels, by F. L. GILL, F.R.A.C.S. 803
The Value of the Rectal Administration of Glucose, by A. B. CORKILL, M.B., B.S., D.Sc. 807
The Quantitative Effect of X Rays on Mitosis in the Mouse Tumour S-37, by WM. H. LOVE, B.Sc., Ph.D. 814
Occupation and Leprosy, by JAMES ROSS INNES, M.D., D.T.M. 815
Increase in Diameter of the Aorta with Age, by J. BURTON CLELAND, M.D. 818

REPORTS OF CASES—
Whooping Cough Eclampsia with Recovery, by MICHAEL KELLY, M.B., B.S. 820
Intussusception in an Adult, by ARCHIE ASPINALL, M.B., Ch.M., F.R.A.C.S. 820
Cholelithiasis and Hydrops of the Gall-Bladder in a Child, by T. J. BIGGS, M.B., Ch.M. 821

REVIEWS—
An Autobiography of Importance 822
Amœbiasis 822

LEADING ARTICLES—
Peptic Ulcer and the Nervous System 823

CURRENT COMMENT—
Human Glanders 824
Rupture of the Kidney after Pyelography 825

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—
Morbid Anatomy 826
Morphology 827

SPECIAL ARTICLE— PAGE.
The Necessary Extension of an Operation: Is it an Assault? 828

BRITISH MEDICAL ASSOCIATION NEWS—
Scientific 830
Nominations and Elections 831
Notice 832

HOSPITALS—
Perth Public Hospital 832

MEDICAL SOCIETIES—
The Victorian Medical Women's Society 833

PUBLIC HEALTH—
Reorganization of the International League Against Epilepsy 833
Poliomyelitis 833

OBITUARY—
Arthur Ellis Blythman 834

STAWELL MEMORIAL FUND 834

BOOKS RECEIVED 834

DIARY FOR THE MONTH 834

MEDICAL APPOINTMENTS VACANT, ETC. 834

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 834

EDITORIAL NOTICES 834

ABERRANT RENAL VESSELS.[1]

By F. L. GILL, F.R.A.C.S.,
Senior Surgeon, Perth Hospital.

GENERAL acceptance has not been given to any explanation so far offered of the fact that a very small number, possibly only 1% or 2%, of the multitude of people with gross renal ptosis have any resulting symptoms.

A generation ago wholesale nephropexies were done, and no steps were taken to prove that the patient's symptoms (if any) were renal in origin. One surgeon of my acquaintance admits to having performed the operation of nephropexy 250 times in three years. Quite naturally the operation for "floating kidney" came under a cloud, but the object of this paper is to attempt to lift that cloud to some extent and to show that it is possible, by modern methods, not only to select from the masses of patients with low kidneys those few who have symptoms directly resulting from their ptosis, but also to select those who will almost certainly benefit by the operation.

There are two factors responsible for the production of symptoms, ptosis and an abnormal relationship between the ureter and the renal blood vessels; of these the latter is the more important.

This paper is based on a detailed analysis of 52 case histories of private patients, in each of whom a definite diagnosis was made of ureteric obstruction as the result of abnormal renal vessels, and in all of whom the diagnosis was confirmed by operation.

Ptosis produces practically no symptoms, certainly no obstructive symptoms, unless it occurs in a patient who has an aberrant vessel; and again aberrant

[1] Read at a meeting of the Western Australian Branch of the British Medical Association, on June 19, 1935.

vessels very rarely produce symptoms until ptosis occurs.

It is significant that in this series 80% of the patients first had symptoms during the third or fourth decade, which is the period of life in which ptosis begins. It must be clearly understood, however, that it is my belief that the vessel is the more important factor of the two. Many of these were not cases of obvious floating kidney, the ptosis not being found on palpation, but being demonstrated by the pyelogram (for example, Figures XIV and XV). In cases such as these nephropexy has not been used, the operation consisting merely of division of the vessel, and the results are equally good.

In further support of this contention is the fact that the vast majority of people with floating kidneys have no obstructive symptoms.

Types of Vessel Causing Obstruction.

The types of abnormally situated vessels which can cause obstruction to the ureter or pelvis are as follow:

1. The worst type is the true polar artery originating from the aorta or iliac artery and entering low in the lower pole of the kidney. This type is fortunately rare. It accounts for nearly all cases with onset of symptoms in early childhood. (Figure I.)

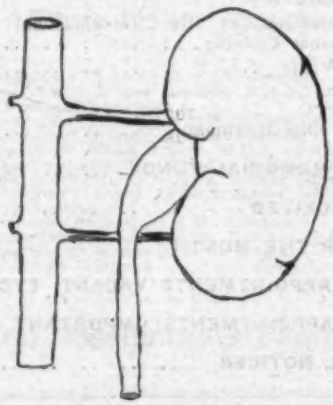

FIGURE I.

2. The next type is a true polar vessel originating as a very early division of the renal artery. (Figure II.)

These two varieties together account for nearly all the true renal colic attacks. In the majority of cases with colic the early history is one of severe ache.

3. Again there may be two inferior branches of the main renal artery, one anterior and one posterior to the pelvis or ureter, so that these structures become caught in a scissor grip. (Figure III.)

4. Finally, when the renal artery divides close to but outside the hilum, the inferior branch may press upon and obstruct the pelvis. Frequently this branch is posterior to the pelvis instead of in the normal anterior position. In about 70% of the series the vessel was in the posterior position. (Figure IV.)

Types 3 and 4 usually produce a fairly persistent ache rather than a true renal colic, and consequently, although the history may be a long one, the degree

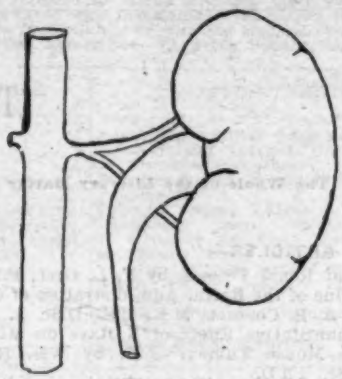

FIGURE II.

of hydronephrosis is as a rule slight. Also, pain may occur in these types even when the degree of ptosis is not great. It will be at once evident that

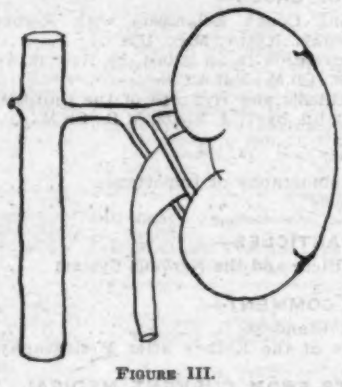

FIGURE III.

Types 3 and 4 present many difficulties, both as regards diagnosis and the advisability of suggesting operative treatment. There even may be difficulties

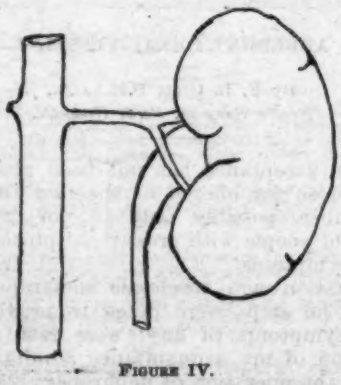

FIGURE IV.

in finding the vessel at operation, but the result of operation is entirely satisfactory in these cases.

Frequency of the condition may be gathered from a glance at Table I.

TABLE I.

Showing the Causes of Obstruction in 100 Consecutive Cases of Renal Colic.

Cause of Obstruction.	Number of Cases.
Stone	63
Aberrant vessel	22
Infection	7
Oxaluria	2
Congenital stricture	2
Tuberculous kidney	3
Tuberculous calcified glands pressing on the ureter	1

Note that in 22 out of this series of 100 cases of renal colic the cause of the renal colic was an aberrant vessel. And since only 50% of the patients with an aberrant vessel had true renal colic, the remaining 50% having only a severe ache, it can at once be seen that the condition is extremely common. It is definitely the second most common cause of kidney pain.

One pictures the sequence of events which ultimately lead to obstruction and hydronephrosis, as follows. With the advent of ptosis the vessel becomes more closely related to the ureter or renal pelvis, even as it were playing upon it like a bow upon a violin string and setting up a local irritation resulting in local spasm with a narrowing of the lumen—a condition, in fact, comparable to cardiospasm or pylorospasm. This, at first minor, obstruction produces a mild degree of pain, a mere dull ache. As time goes on hydronephrosis begins to appear. The little bulge above the vessel becomes more pronounced, till finally it suddenly flops over the vessel, dragging the ureter with it and producing the first attack of renal colic. (Figure V.) It is certainly a fact that the first renal colic is practically always preceded by many months of mild dull ache.

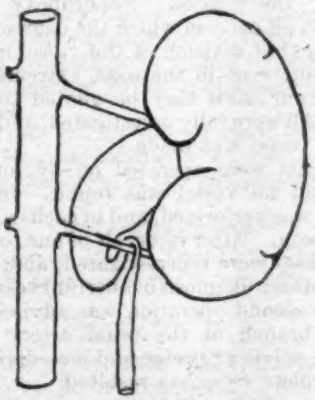

FIGURE V.

Some interesting figures emerge from the analysis of these 52 cases.

Sex.—Of the 52 patients, 13 were males and 39 females. Thirty-two of the women were married, and seven were single. It is interesting to note that five out of the seven single women were nurses, also quite a number of the married women had trained as nurses, though the exact figure is not available.

Side Affected.—In 28 cases the right kidney was affected; in 21 the left was affected, and in three cases both kidneys were involved.

The figures relating to the sex of the patient and the side affected are extremely important, because of course ptosis is nearly ten times more common on the right side, and ten times more common in females. Aberrant vessels are equally common the two sides and in both sexes, which strengthens the contention that the vessel is a more important factor than the ptosis.

Age at Onset of Symptoms.—The age of the patients at onset of symptoms is shown in Table II.

TABLE II.

Decade.	Number of Cases.	
First	2	
Second	3	
Third	23	40=80%
Fourth	17	
Fifth	4	
Sixth or over	3	
Total	52	

Note that it is during the third and fourth decade that ptosis occurs.

Situation of Pain.—In 48 cases the pain was in the lumbar region; in 12 it was in the hypochondrium, and in 16 in the iliac fossa. The presence of pain in the iliac fossa indicates that a small section of ureter is being dilated as well as the pelvis, and therefore suggests a polar vessel crossing just below the junction of the pelvis and the ureter.

Type of Pain.—In 26 cases (50%) the pain was colicky; in 22 it was a severe ache, and in four it was a slight ache.

Type of Vessel.—In 48 cases the vessel was an artery; in four it was a vein only.

Origin of Artery.—In 31 instances the vessel arose from the renal artery; in four cases it arose from the aorta; in 16 instances the origin of the vessel was unknown. Many vessels of untraced origin probably arose from the aorta.

Relation to the Ureter.—In 30% of cases the vessel was anterior to the ureter; in 70% it was in posterior relationship.

Degree of Hydronephrosis and Length of History.—The degree of hydronephrosis and the length of history are shown in relation to one another in Table III.

TABLE III.

Capacity of Hydronephrotic Sac.	Number of Cases.	Length of History.
Under 10 cubic centimetres	21	Majority under one year.
10 to 20 cubic centimetres	16	Majority under four years.
Over 20 cubic centimetres	12	Majority over four years.
Not measured	3	
Total	52	

Stone, Infection and Hæmaturia.—The relationship between stone, infection and hæmaturia is set out in Table IV.

TABLE IV.

Complication.	Number of Cases.	Observation.
Stone present	9	1 with infection.
Infection present	9	1 with stone.
Hæmaturia	9	4 with stone. 5 without stone.

Note that 17 cases or roughly 34% of the series were complicated by stone or infection, obviously the result of stasis. The majority of infections cleared up after operation with no further treatment.

It is firmly believed that when operating for renal calculus it is essential to divide any aberrant vessel which may be present, otherwise the stone will tend to recur. The contention is that the vessel, by producing stasis, not only leads to stone formation, but that it also prevents the passage of the stone down the ureter in the early stage of its formation. It is certainly a fact that, if looked for as a routine, a vessel will be found in a large proportion of cases of renal calculus. This statement was made by me five years ago; since then in every case in which I have operated for renal calculus I have, with only one exception, found an obstructing vessel.

There is another interesting fact regarding the relation between aberrant vessels and large renal calculi. Every surgeon must have been struck by the frequent complete absence of pain in the presence of large calculi. The reason is that it is the rule in such cases to find a large artery crossing the pelvis just outside the hilum, nearly always a branch of the renal artery, which prevents the stone from engaging in the pelvo-ureteric junction and causing obstructive pain.

It may be argued that many large stones send into the calyces branches which keep the stones from engaging in the ureter, but this would not explain the absence of pain when the stone was small enough to be freely mobile.

Diagnosis.

All cases of floating kidney without pain, hæmaturia, or symptoms of chronic infection should be rejected.

Pain.—Referring again to Table I (100 cases of colic), it will be seen that, given a patient complaining of renal colic (and the same applies in practice to severe kidney ache), if X ray examination excludes stone and tuberculous glands in contact with the ureter, if culture of urine excludes pyogenic infection, and if microscopic examination excludes oxaluria and tuberculous infection, then the diagnosis rests between congenital valve and stricture, both of which are extremely rare, and obstruction by a vessel. In other words, every general practitioner should, after the above routine investigation, be able to recognize the condition in the majority of cases. A pyelogram will then complete the diagnosis, provided that it shows: (i) a low kidney, (ii) a hydronephrosis, (iii) an abnormality indicating the presence and site of the vessel.

This abnormality may be (i) an S-shaped kink of ureter (Figures VI, VII and VIII), (ii) an acute pelvo-ureteric junction (Figures IX, X and XI), (iii) a hiatus at the spot where the dilatation ceases, this being the situation of the vessel (Figures XII, XIII and XIV), (iv) gross dilatation of the pelvis with a perfectly normal ureter (Figures XV, XVI and XVII).

Intravenous urograms in these cases are far inferior to pyelograms. Always beware of beautiful S bends without any sign of hydronephrosis; they are a snare and a delusion.

Hæmaturia.—Hæmaturia occurred in 10% of the cases without stone and without infection; what the explanation is I do not know, but all five patients had true colic. When investigating a case of renal hæmaturia with pain, and having excluded all possible causes, such as neoplasms, tuberculosis, stone *et cetera*, it is always worth while to remember the possibility of an aberrant vessel, especially if the kidney is palpable. A pyelogram will settle the point, for a well-marked hydronephrosis is always present. By remembering this we shall still further reduce the rapidly vanishing number of cases of essential hæmaturia.

Chronic Infection.—In this series 18% of patients were infected; therefore in all cases of chronic pyelitis which have been resistant to treatment an investigation should be made for a possible aberrant vessel as the underlying cause of stasis. The removal of the vessel nearly always results in the clearing up of the infection which will not otherwise respond to treatment.

Stone.—An operation for removal of stone is not complete if a vessel is not looked for and removed if present.

Treatment.

The essential point in treatment is the finding and division of the vessel. Nephropexy has been abandoned in all cases in which the degree of mobility is only slight, but division of the vessel must always be carried out, even in the most extreme degrees of mobility. Four cases may be quoted to emphasize the point. All were fully investigated, and a diagnosis of aberrant vessel was made.

The patients were operated on by four different surgeons, and no vessel was found. In each case nephropexy was performed, and in each case there was no relief of pain. After intervals of one to three years these four cases were reinvestigated, and, despite the operation notes, a diagnosis of aberrant vessel was again made and a second operation was advised. In each instance a branch of the renal artery was found crossing the pelvis or ureter and was divided, and in each a complete cure has resulted.

Dangers of Dividing Renal Vessels.—Much has been written condemning the division of renal vessels, purely on the grounds that as they are end arteries their ligation must be followed by infarction. This is perfectly true; but the area lost is usually a very small one, certainly less than one-quarter of the total kidney in the worst type of case, so surely this small loss is infinitely preferable to nephrectomy.

In this series there was no death, nor in a single case was any anxiety caused by symptoms which

pointed to the presence of severe changes in the kidney.

The 52 operations in this series have all been done in private practice; more than twice this number have been done in public hospitals, with the same experience. It is therefore reasonable to state that the dangers, if any, are certainly negligible.

On three occasions a polar artery has been tied in a patient with a single kidney with no untoward results.

Results.

The following results have been revealed by "following-up" the patients. They have been graded into three groups, as follows:

1. "Complete cure", 71% .. .. .. } 90% success.
2. "Greatly relieved, quite satisfied with result", 19% .. .. }
3. "Slight improvement" in all remaining 10%.

Of the patients in this series 26% had undergone previous operations for their pain without relief. The operations most frequently done were appendicectomy, oophorectomy, cholecystectomy.

When it is remembered that many of these patients are of a highly neurotic type, often as the result of suffering for many years from an undiagnosed complaint, the above results speak for themselves.

Conclusions.

1. Renal vessels, chiefly arterial branches, are the second most frequent cause of ureteric obstruction, and therefore of renal pain.
2. Of all forms of renal colic 22% are due to this cause.
3. It is the combination of ptosis and aberrant vessel which causes trouble; either one of these factors acting alone very rarely causes trouble.
4. The resulting stasis is a powerful factor in the causation of renal calculi and chronic pyelitis. Compare vesical calculus and cystitis, complicating an enlarged prostate and urethral stricture.
5. The dangers of dividing aberrant renal arteries are negligible.
6. Our critics tell us that we are dividing perfectly normal anatomical variants of the renal artery. Our reply is that 90% of our patients are completely satisfied.

Acknowledgements.

My thanks are due to Dr. A. S. and Dr. M. B. Johnson for their uniformly excellent radiological assistance.

THE VALUE OF THE RECTAL ADMINISTRATION OF GLUCOSE.[1]

By A. B. Corkill, M.B., B.S., D.Sc.,
From the Baker Medical Research Institute, Alfred Hospital, Melbourne.

Many of you who have accepted the rectal administration of glucose as a standard form of treatment for certain conditions will no doubt be puzzled at the subject that I propose to discuss. The title of my paper implies that the value of this treatment has been called in question. Personally, I must admit that until recently I never had occasion to query its usefulness. Some months ago, however, my complacence in this direction was greatly disturbed when the senior surgeon of the hospital requested me to give an opinion, backed by proofs, as to whether glucose was appreciably absorbed from the human rectum. Having never seriously considered the problem, I was unable to give an immediate answer and delayed doing so until I had opportunity to consult the literature. Hastily perusing this, I was amazed to find that the available evidence was extremely chaotic, so much so that I was unable to form an opinion one way or the other. Next, an attempt was made to ascertain the physiological considerations that had originally suggested the rectal administration of glucose as a therapeutic procedure. An intensive search of the literature failed to reveal these, and I began to wonder whether we were dealing with another instance of a treatment having been widely accepted for a number of years without adequate attention having been paid to the scientific basis for its application.

As a matter of interest I questioned several of my medical and surgical colleagues as to their opinions concerning the absorption of glucose from the human rectum. Here again the answers were delightfully vague. The majority expressed the view that glucose was undoubtedly absorbed, but when pressed for reasons, such statements as "Well, it must be absorbed" or "I feel certain that it is of value" were elicited.

Now let us briefly review the literature on this question. Many investigations have been made on the systemic blood glucose after the administration of glucose by the rectum. The results have been conflicting and unconvincing, particularly as in some instances the tests were carried out on subjects in whom a disturbed carbohydrate metabolism was present. Such evidence must therefore be unhesitatingly rejected. Those observers who failed to note a rise in the systemic blood glucose of normal subjects considered this as evidence that glucose was not absorbed from the rectum. However, such a negative finding does not exclude the possibility of a slow, but nevertheless, from the therapeutic standpoint, useful, absorption. In order to appreciate this point it is necessary to consider the modern conception of the rôle played by the liver in carbohydrate metabolism. In Figure I a chain of carbohydrate changes embodying the Cori cycle is shown, and it will be observed that liver glycogen supplies glucose to the blood stream and that under the action of insulin this glucose is stored as muscle glycogen. The later, whilst not being able to contribute directly to the blood glucose, may indirectly do so by breaking down to lactic acid, which is resynthesized to liver glycogen.

The liver can be regarded as an extremely sensitive mechanism for maintaining an adequate reserve

[1] Read at a meeting of the Alfred Hospital Clinical Society, February, 1936.

of carbohydrate and a steady blood glucose level. Its self-regulating mechanism, or homoiostasis, consists in adjusting new carbohydrate formation from protein and fat to the rate of glycogen breakdown required to maintain a normal blood glucose level. The sudden addition of free glucose to this system, as would occur after oral administration, causes a temporary loss of balance. Following absorption from the intestine, an excess of free glucose is present in the liver; this glucose, escaping into the systemic circulation, produces the usual hyperglycæmia that one observes under such conditions. In the blood stream the glucose is either directly oxidized or, under the action of insulin, stored as muscle glycogen. In addition, the liver compensates for the excess of glucose by slowing down the rate of glycogen breakdown, and as these two factors become fully established the blood glucose falls to its normal or to a slightly lower level.

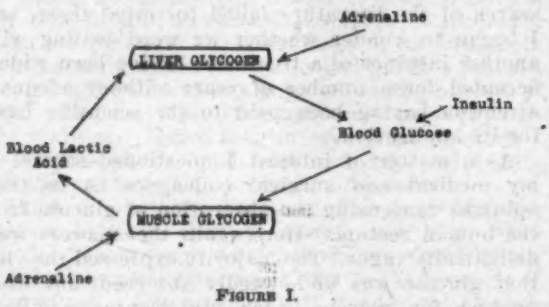

FIGURE I.

From a consideration of the above it follows that a more gradual addition of glucose, as might possibly occur after rectal administration, would not acutely disturb the regulatory mechanism; and although a considerable amount of glucose might be absorbed over a longer period, no evidence of this absorption could be elicited from a study of the systemic blood glucose. In other words, with a slow absorption the liver could fully compensate by adjusting the process of glycogen breakdown to keep pace with the addition of glucose and hence no hyperglycæmia would be produced.

In the foregoing remarks you will notice that I have made no mention of the fact that the liver might possibly form glycogen from the ingested glucose. Whether this occurs is still a debatable point, and although we all know that glycogen deposition occurs after the oral administration of glucose, we must remember that this might be an indirect effect due to the liver inhibiting glycogen breakdown and thus conserving its existing supply. The net result would be storage, but, as Lovatt Evans[1] has recently indicated, the origin of this glycogen presented a problem that perplexed even Claude Bernard.[1]

La matière glycogène formée en plus grande abondance dans le foie sous l'influence de l'alimentation sucrée est-elle le résultat d'une conversion directe, par voie régressive, du sucre en glycogène, ou bien le sucre ne jouerait-il là que le rôle d'un excitant nutritif puissant qui exagérerait singulièrement la fonction glycogénésique du foie? (Page 321.)

. . . mais comment le sucre agit-il dans ce cas, comme excitant nutritif ou comme principe directement transformable en glycogène? Je penche, je dois le dire, pour la première opinion jusqu'à plus ample informé. (*Le Diabète*, 1877, page 323.)

[1] Quoted from a paper by Lovatt Evans.

Other investigators have attempted to compare the effects of oral and rectal glucose in relieving ketosis. Thus Bergmark[2] found that rectally administered glucose, although not raising the blood glucose level, had a normal effect in reducing ketosis. Many other investigations on these lines have been carried out, but unfortunately strictly quantitative data on the reduction of ketosis is lacking. In other attempts to solve the problem the respiratory quotient has been studied after the rectal administration of glucose, but again conflicting results have been presented. Direct studies on the blood glucose from a venous radicle in the rectal circulation after the administration of glucose has been undertaken by McNealy and Willems.[3] In addition, these workers washed out the rectum some time after the injection of glucose and thus sought to determine the amount that had been absorbed after a stated interval. For the purposes of comparison, the same amount of glucose was injected into the small intestine and a similar recovery experiment performed. In Table I the results of one of their experiments are shown, and from such results the authors concluded that the rectum could not within one and a half hours absorb any appreciable amount of glucose.

TABLE I.

Glucose Injected.		Glucose Recovered after one and a half Hours.	
Rectum.	Ileum.	Rectum.	Ileum.
Grammes. 4·42	Grammes. 4·42	Grammes. 4·36	Grammes. 1·81

Apart from the inherent errors of this recovery technique, the results, although suggesting that the rectum has not any marked powers of glucose absorption, do not completely rule out the possibility of delayed action.

From a consideration of the foregoing remarks it should be clear that the whole question needs critical examination, particularly from the standpoint of ascertaining whether any slight absorption occurs that may be of therapeutic value. Accordingly, a number of investigations have been undertaken, and in the following remarks I shall describe the results and the conclusions drawn from them.

Physiological Considerations.

It is a well known fact that certain substances are definitely absorbed from the human rectum; amongst them may be cited ether, bromides and

water. From a purely physiological aspect one would expect glucose absorption to be confined to such animals that are capable of digesting cellulose. Rabbits and goats have in the large bowel special enzymes concerned with the transformation of cellulose into glucose and naturally one would expect glucose absorption to occur from the colon of members of these species. It is a well known fact that a goat may be maintained on a diet of blotting paper. On the other hand, cellulose serves in man merely to give consistency to the bowel contents and is not digested. Hence there should be no reason for the colon in man to be adapted to absorb glucose.

That animals equipped to break down and utilize cellulose can readily absorb glucose will be seen from the following experiment.

Glucose Absorption in Herbivorous Animals.

Two young rabbits, aged eight weeks, and from the same litter, were taken and food was withheld from them for twenty-four hours. One rabbit received three grammes of glucose *per rectum*. Blood sugar estimations were carried out every half hour. At the end of two hours the animal was sacrificed and the liver was examined for glycogen content. At the same time the control animal was similarly treated.

The blood glucose of the animal experimented on was 98 milligrammes *per centum* before the glucose was given. At intervals of 30, 60, 90 and 120 minutes after the glucose was given the blood glucose figures were respectively 115, 139, 168 and 154 milligrammes *per centum*; the animal's liver glycogen was 1·9%. The liver glycogen of the control animal was 0·35%.

It is clear from the blood glucose response and the deposition of liver glycogen that glucose administered rectally to the rabbit is rapidly absorbed into the circulation and stored as glycogen in the liver.

In our own studies the problem has been attacked along the following lines: (i) Glucose absorption from the rectum has been studied in dogs under "Amytal" anæsthesia. (ii) The effect of rectally administered glucose on ketosis has been investigated in a number of normal individuals.

Animal Experiments.

In a previous section attention has been drawn to the fact that blood glucose studies on the systemic circulation are apt to give misleading information on the power of the colon to absorb glucose. If exact knowledge is desired, the only safe procedure is to make estimations on blood, taken either from the portal circulation or from the inferior hæmorrhoidal vein. Again, if we intend to base our conclusions on alterations in the blood glucose level, the choice of a suitable anæsthetic needs careful consideration, since most of them cause *per se* a rise in the blood glucose level. In our hands "Sodium amytal", used with certain precautions, was found to be very satisfactory. The procedure was somewhat as follows.

After a preliminary injection of morphine, 0·03 to 0·06 gramme (half to one grain), the dog was given a series of intraperitoneal injections of "Amytal". Artificial respiration was carried out by means of a tracheal cannula attached to a respiration pump. Samples of blood for analysis were taken from the carotid artery and inferior hæmorrhoidal vein. After a series of steady control values had been obtained, glucose was introduced by the abdominal route into the rectum and a further series of blood samples was taken.

Somewhat similar experiments were carried out by McNealy and Willems, but their results are open to criticism on two grounds: first, that their experimental period (one and a half hours) was too short, and secondly, that the anæsthetic used, namely, sodium barbital supplemented by ether, is not, as they claim, without effect on the blood glucose.

The following experiment demonstrates the suitability of "Amytal" for this type of investigation.

A dog that had been fasting for forty-eight hours was given 0·03 gramme (half a grain) of morphine at 9.30 a.m. At 10.35 a.m. two cubic centimetres of 10% "Sodium amytal" were injected intraperitoneally. At 11.05 a.m. one cubic centimetre of 10% "Sodium amytal" was injected intraperitoneally. At 11.30 a.m. artificial respiration was applied. At 11.40 a.m. the abdomen was carefully opened. The rectum and inferior hæmorrhoidal vein were brought into view. The wound was kept closed by means of large clamps with metal protected by rubber. Blood samples were taken with a syringe fitted with a fine, sharp needle. The results are shown in Table II.

TABLE II.

Time.	Blood Glucose in Milligrammes *per centum*.	
	Carotid Artery.	Inferior Hæmorrhoidal Vein.
11.54 a.m.	102	100
12.35 p.m.	102	101
1.20 p.m.	81	80
1.50 p.m.	92	90
2.20 p.m.	80	80
2.50 p.m.	90	90
3.20 p.m.	100	100
3.50 p.m.	98	99

Under the above conditions "Amytal" has not caused any marked fluctuations in the blood glucose and affords critical conditions for studying the effect of rectally administered glucose. Several similar control experiments were carried out, and, although a mild hyperglycæmia occasionally occurred in the initial stages, a steady state was soon attained and was not disturbed by further injections of "Amytal".

In all experiments precautions were taken to ascertain that the blood glucose was maintained at a constant and approximately normal level for some time before glucose was injected.

Results.

In all, fourteen experiments on the above lines have been carried out, and since the results were invariably in the same direction, it will suffice to present one experiment in detail.

A dog that had been fasting for forty-eight hours was given a preliminary injection of morphine, 0·03 gramme (half a grain). "Amytal" anæsthesia and artificial respiration were used. Blood samples for glucose estimation were taken from (i) the inferior hæmorrhoidal vein, (ii) the venous return of an intestinal loop, (iii) the carotid artery. Glucose was injected, as shown, into the rectum and small intestine. The results are given in Table III.

TABLE III.

Time.	Blood Glucose in Milligrammes *per centum*.		
	Inferior Hæmorrhoidal Vein.	Intestinal Vein.	Carotid Artery.
11.00	127	—	125
11.20	108	101	108
11.50	108	99	96
12.20	97	101	99
12.40	98	99	97
6 grammes of glucose injected into rectum →			
10 minutes ..	100	—	98
20 minutes ..	98	—	96
30 minutes ..	102	101	100
60 minutes ..	88	102	99
90 minutes ..	90	100	90
5 grammes of glucose injected into small intestine .. .. →			
10 minutes ..	—	154	103
20 minutes ..	—	187	146

Following the injection of glucose into the rectum, the blood returning from this portion of the bowel failed to yield any evidence suggestive of even a slow rate of absorption. On the other hand, glucose injected into the small intestine is rapidly absorbed, as judged by its effect on the blood glucose. Accordingly, it seems safe to assume that in the dog no significant amount of glucose is absorbed from the rectum. Immediately the question arises as to how far such results can be applied to man. There seems no reasonable objection as to why they could not be directly applied, but in order to be quite certain, a number of experiments on man have been carried out. Naturally the same experimental procedure cannot be adopted and considerable difficulty was experienced in devising suitable conditions. Finally, the most satisfactory method appeared to be a study of the effect of rectal glucose on ketosis. The literature contains some references to this problem, but unfortunately no quantitative data are available and beyond various vague statements that the ketosis is lessened there is nothing definite to go on. Therefore it was determined to estimate quantitatively the effect on ketosis of glucose given by the rectum.

Experiments on Man.

At the outset the question arises as to what constitutes a physiological dose of glucose to be administered *per rectum*. Various criticisms have been made concerning the amounts used by different workers, chiefly on the ground that the solutions used have been hypertonic and hence irritating to the bowel. Strictly speaking, an approximately 5% solution is iso-tonic and for this reason should be used. Actually considerable variations in the tolerance of the bowel are encountered and in some instances patients could retain an enema consisting of 600 cubic centimetres of 12% glucose. To one patient glucose was administered at the rate of thirty grammes per hour by a continuous drip apparatus, for a period of eight hours. In many of these cases half-hourly blood glucose estimations were carried out for a period of five hours. With due regard to the possibility of a slow absorption failing to cause any rise in the systemic blood glucose, it is at least significant to note that in the cases in which large amounts of glucose were allowed to remain in the bowel for a considerable period, no rise in the systemic blood glucose was observed.

Studies on Ketosis.

Although the mechanism is not yet fully understood, it is now realized that simultaneous glucose oxidation is necessary for the final stages of fat oxidation. In the absence of the former, the latter is incomplete and "acetone bodies" accumulate in the body. An adequate carbohydrate component in the diet insures complete fat oxidation; and, alternatively, should ketosis occur through an insufficient supply of carbohydrate, addition of carbohydrate soon restores the fat metabolism to normal. Although it is common knowledge that glucose oxidation plays a most important rôle in metabolic processes, I must remind you that the chemical change involved is of a far more intricate nature than that shown in the equation

$$C_6H_{12}O_6 + 6O_2 = 6CO_2 + 6H_2O.$$

Some idea of the complex series of reactions occurring may be realized from a study of Figure II,

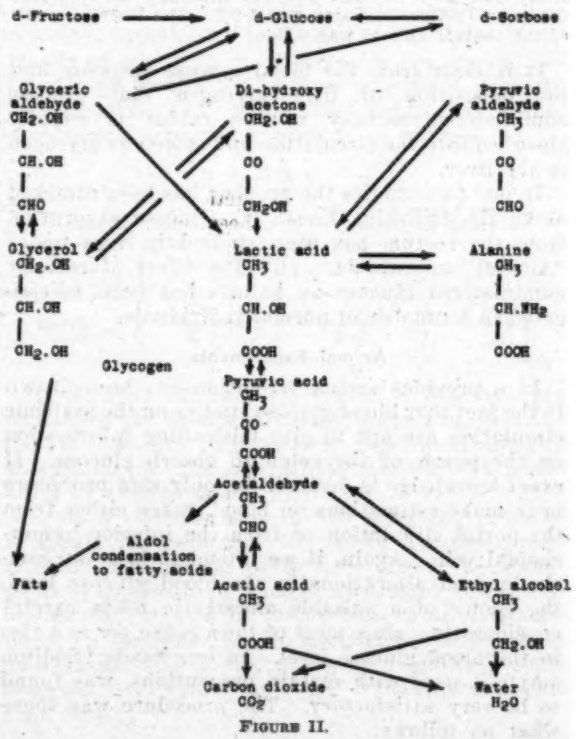

FIGURE II.

which has been taken from "A Textbook of Biochemistry" (page 324), by A. T. Cameron. It has been shown that these reactions may be involved

in the conversion of glucose to fat and in the direct oxidation of glucose. In the oxidation of fat it is believed that a process of desaturation occurs in the liver. The long-chained fatty acid molecule is shortened until reduced to a 4 carbon compound. As an example we may take a 6 carbon compound:

$$CH_3.CH_2.CH_2.CH_2.CH_2.COOH.$$

By means of β-oxidation we have:

$$CH_3.CH_2.CH_2.CO.CH_2.COOH$$

and then $CH_3.CH_2.CH_2.COOH$ (butyric acid).

Again by β-oxidation we have:

$$CH_3.CO.CH_2.COOH \text{ (aceto-acetic acid).}$$

By reduction this is converted into β-hydroxybutyric acid.

In the normal individual, by means of simultaneous glucose oxidation, both aceto-acetic acid and β-hydroxybutyric acid are fully oxidized. In diabetes, in which glucose oxidation is impaired, complete fat oxidation does not occur and ketone bodies accumulate in the body. A similar state of affairs is present when, with an excessive fat diet, insufficient glucose is available to assist in the oxidation of fats.

Although it is realized that glucose oxidation is required to complete fat oxidation, the mechanism of this is by no means clear. It has been suggested that during the final stages of fat oxidation various intermediate combinations of fatty acid and glucose decomposition products are formed. Unfortunately, no experimental proof of this hypothesis exists.

Recent work by Himsworth[4] has clearly indicated that a diet rich in fat decreases glucose tolerance and diminishes the action of insulin on the blood glucose. It has been suggested that insulin, when secreted from the pancreas, is an inactive substance and requires to be activated in the body by some unknown factor and, further, that the activity of this factor is lessened by a diet excessively rich in fat. Although in otherwise normal persons ketosis may be relieved by the oral administration of glucose, it must not be assumed that the restoration to normal is immediate. Even after the administration of large amounts of glucose a marked ketosis may take from twenty-four to thirty-six hours to disappear completely. Occasionally it may be noted that glucose administered to a patient suffering from ketosis may initially appear to cause an increase in the acetone bodies. Obviously this cannot be taken at its face value, but merely serves to indicate that the ketosis has caused such a profound disturbance in carbohydrate metabolism that some considerable time is required before glucose oxidation proceeds in a normal manner.

In the first experiments in this section we produced ketosis by a diet of the type shown in Table IV and then attempted to compare the effects of orally and rectally administered glucose in relieving this state.

TABLE IV.
Ketogenic Diet, Alfred Hospital.

Type of Food and Quantity.	Carbohydrate.	Protein.	Fat.
Breakfast:			
Egg 1	—	6·7	5·3
Bacon .. 1½ ozs.	—	4·7	29·1
Milk .. .. 5 ozs.	7·5	5·0	6·0
Butter .. .. ½ ozs.	—	0·3	32·4
Cream .. .. 1 oz.	1·1	0·7	9·6
Total	8·6	17·4	82·4
Dinner:			
Meat .. .. 2½ ozs.	—	14·1	14·1
3% Vegetable 3 ozs.	2·7	1·4	0·3
15% Fruit .. 2 ozs.	7·6	0·5	0·3
Cream .. .. 1½ ozs.	1·7	1·0	14·4
Butter .. .. 1½ ozs.	—	0·4	38·7
Total	12·0	17·4	67·8
Supper:			
Meat .. .. 1½ ozs.	—	8·5	8·5
15% Fruit .. 2 ozs.	7·6	0·5	0·4
Milk .. .. 1½ ozs.	2·2	1·5	1·8
Cream .. .. 1 oz.	1·1	0·7	9·6
Butter .. .. 1½ ozs.	—	0·4	38·7
Total	10·9	11·6	59·0
Grand total ..	31·5	46·4	209·2

The value of the diet is as follows:

Carbohydrate	31
Protein	46
Fat	209
Calories	2,180
Total glucose	78
Fatty acid	207
Fatty acid/glucose ratio	2·7:1

Unfortunately this procedure proved unsatisfactory. The variations that the same individual showed from day to day were of such magnitude that it would have been quite impossible to judge the effect of glucose. This position may be appreciated by a study of Chart I. In this experiment the patient was placed on the ketogenic diet and complete twenty-four hour specimens of urine were collected. Total acetone bodies were estimated by the method of Hubbard.[5]

Whilst dealing with the question of ketosis, I should like to refresh your memory for a moment concerning the chemical tests for this condition. The Rothera test will detect acetone and aceto-acetic acid, whilst Gerhardt's test detects only aceto-acetic acid. As regards sensitivity, the Rothera test will give a positive reaction with aceto-acetic acid in a concentration of four milligrammes *per centum*, whilst Gerhardt's test gives a positive reaction only when the concentration reaches ten milligrammes *per centum*.

Now in Table V different degrees of ketosis and their relations to the Rothera and Gerhardt tests are shown, and you will notice that the true factor to be considered is not the actual amount of ketone

bodies present, but their concentration. This is particularly true for a mild form of ketosis. It is also apparent that, applying the tests for ketosis in the usual manner, no accurate quantitative dis-

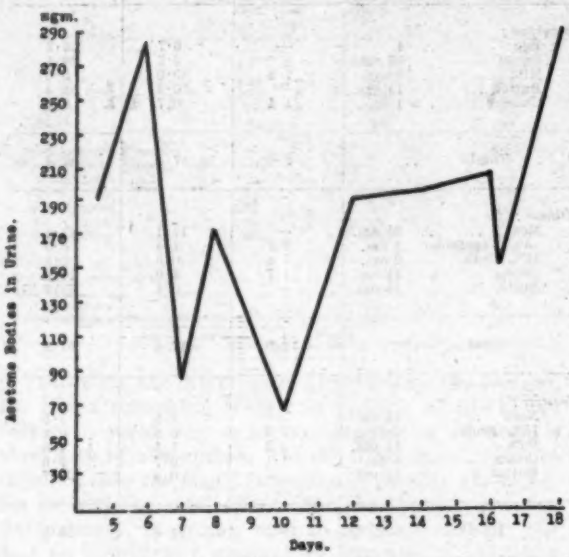

CHART I.

tinction could be made between a concentration of 75 milligrammes *per centum* and one of 168 milligrammes *per centum*.

TABLE V.
Degrees of Ketosis in Present Investigation.

	Rothera.	Gerhardt.	Total Acetone. Milligrammes *per centum*.	
Short period of starvation ..	—	—	18	1·8
	+	—	11	5·0
	+	—	23	5·8
	++	—	50	8·8
Ketogenic diets ..	++	+	700	75·0
	++	+	1,800	168·0

In the past, as already mentioned, misleading information on the effect of rectally administered glucose on ketosis has been elicited by relying on purely qualitative tests for ketosis. In the present investigation we have invariably expressed our results in terms of the total amount of ketone bodies excreted in twenty-four hour specimens of urine and their concentration as milligrammes *per centum*.

In further experiments with volunteer patients the following scheme was carried out.

Ketosis was produced by a diet of the type shown below:

A: Carbohydrate, 7·1 grammes; protein, 31 grammes; fat, 173 grammes. Fatty acid/glucose ratio, 4:1.

Apart from the highly ketogenic nature of this diet it is distinctly not a maintenance one and is capable of producing a marked ketosis within forty-eight hours. At the end of this time the following diet was given:

B: Carbohydrate, 100 grammes; protein, 70 grammes; fat, 75 grammes.

The total acetone bodies excreted in the urine were estimated for each twenty-four hour period, and, although individual variations occurred, it was observed that twenty-four hours after the change-over to diet *B* an approximately 70% reduction in the ketosis occurred. The following plan was then carried out on a number of patients. Diet *A* was given and the total urinary output of ketone bodies for twenty-four hour periods was estimated. At the end of forty-eight hours diet *B* was given for a period of two to three days. Curve I, Chart II, shows a typical response. After an interval of some weeks the same patient was taken and again placed on diet *A* for forty-eight hours. At the end of this time diet *B* was given, but 40 grammes of carbohydrate were omitted and 80 grammes were given by the rectum instead. Those experiments in which the glucose was not retained were disregarded. From other experiments it was elicited that even if 20 grammes were absorbed, a slight reduction in the ketosis might be expected. In actual fact no such reduction was ever observed and we must therefore conclude that under the above conditions the rectum was unable to absorb any appreciable amount of glucose.

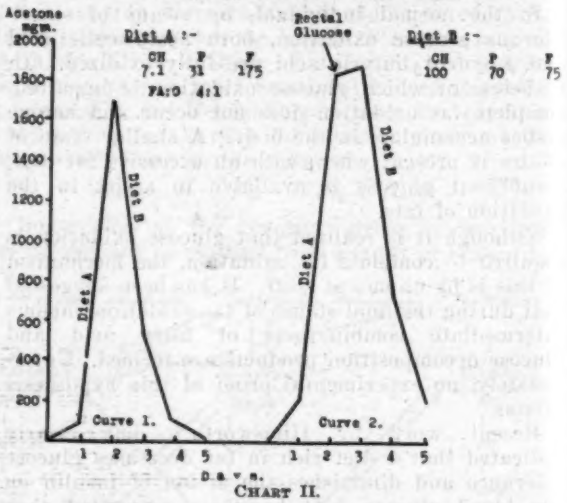

CHART II.

In Curve 2, Chart II, the results from an experiment similar to that described above are shown, and it will be noted that the glucose administered rectally has not in any sense reduced the ketosis. The actual figures from this experiment are shown in Table VI.

TABLE VI.
Rectal Glucose and Ketosis.

Total Acetone.		Result of Rothera Test.	Days on Diet.	Diet.			
Milligrammes.	Milligrammes *per centum*.			Carbohydrate.	Protein.	Fat.	
50	4·8	+	1	7·1	31	173	FA:G=4:1.
1,445	153·0	+++	2	100	70	75	FA:G=1:1·4
350	40·0	++	3				
49	4·7	+	4				
59	5·1	+	1	7·1	31	173	
1,800	175·0	+++	2	60	70	75	40 grammes glucose rectally.
1,820	184·0	+++	3	100	70	75	
380	45·0	++	4				

It may be argued that the amount of glucose administered, that is, 80 grammes in 600 cubic centimetres of tap-water, was unphysiological and would not, by virtue of its hypertonicity, tend to be absorbed. However, in other experiments isotonic solutions were administered with exactly the same result as that shown above. It might be further argued that, although the rectum fails to absorb 40 grammes of glucose, it might still be capable, within the stated experimental period, of absorbing smaller amounts. It seems unlikely that smaller amounts, even if absorbed, would be of any therapeutic value, either from the standpoint of nutrition or of controlling ketosis. However, in order to present a complete story, we have considered this latter question and have devised experiments planned to detect whether absorption of smaller amounts of glucose occurs.

A number of normal individuals were selected and placed on what was practically a starvation *régime*. Lettuce and bran biscuits of negligible carbohydrate content were given. Total urinary acetone excretion was estimated for three periods as shown below:

Period *A*: Starvation lasting from 8 a.m. to 8 a.m.
Period *B*: Starvation continuing from 8 a.m. to noon.
Period *C*: Normal diet from noon to 8 a.m.

The total experiment thus lasted for forty-eight hours, and, although marked individual variations occurred, it was surprising to note that the same patient showed a very uniform response to repetitions of this test.

It must be realized that the ketosis produced by this form of treatment is of a very mild nature and responds readily to orally administered glucose. In Table VII the responses of two patients are shown.

TABLE VII.

Showing Individual Variations in Ketosis.

Patient.	Period.	Acetone Excretion.		Result of Rothera Test.
		Milligrammes.	Milligrammes *per centum*.	
R	48 hours. 8 a.m.–8 a.m. Starvation "A"	18·0	2·0	–
	8 a.m.–12 noon. Starvation "B"	11·0	4·2	+
	12 noon–8 a.m. Ordinary diet "C"	28·0	5·0	+
	Total	57·0		
H	48 hours. 8 a.m.–8 a.m. Starvation "A"	20·0	1·7	–
	8 a.m.–12 noon. Starvation "B"	50·0	8·0	++
	12 noon–8 a.m. Ordinary diet "C"	17·6	6·4	+
	Total	87·6		

Next, we selected a patient who, on at least two tests, developed approximately the same degree of ketosis. Such a case is shown in (*a*), Table VIII.

In all experiments of this nature we were very fortunate in having the willing and intelligent cooperation of a number of hospital patients, most of whom were "fracture cases".

TABLE VIII.

Effect of Oral Glucose on Mild Forms of Ketosis.

Patient.	Period.	Total Acetone in Milligrammes.	Result of Rothera Test.
R (*a*)	48 hours. 8 a.m.–8 a.m. "A"	18	–
	8 a.m.–12 noon. "B"	11	+
	12 noon–8 a.m. "C"	28	+
	Total	57	
(*b*)	48 hours. 8 a.m.–8 a.m. "A"	13	–
	10 grammes glucose at 4 p.m.		
	8 a.m.–12 noon. "B"	5	–
	12 noon–8 a.m. "C"	8	–
	Total	26	

This patient was next treated as shown in (*b*), Table VIII. The chief difference between this and the previous experiment was that 10 grammes of glucose were administered orally at the time shown. It will be observed that this orally administered glucose has substantially prevented the development of ketosis. As previously emphasized, individual patients developed a very constant ketosis in response to this starvation *régime*. It was found that the oral administration of glucose about eight hours from the commencement of the first starvation period would prevent the subsequent development of ketosis. The smallest effective dose varied in different individuals. In patient *H*, Table VII, 20 grammes were required, whilst in patient *R*, Table VII, 10 grammes were sufficient. From studies on a number of individuals who showed a degree of ketosis similar to that of subject *R*, Table VII, it was elicited that 10 grammes was the smallest dose that could prevent the development of a mild ketosis. Accordingly, for the present investigation we selected patients who responded in a similar fashion to this patient.

In Table IX the results of a further experiment on the same patient are shown. Here, 30 grammes of glucose were administered as an enema. It will be noted that this procedure was ineffectual in preventing ketosis.

Briefly, then, the results of this last series of experiments may be summarized as follows. A patient in whom starvation produced a mild degree of ketosis was selected. The development of ketosis could, in this patient, be prevented by the oral administration of 10 grammes of glucose during the starvation period, but, on the other hand, 30 grammes given *per rectum* failed to do so. It was

therefore concluded that, under the above experimental conditions, the human rectum could not absorb 10 grammes of glucose.

TABLE IX.

Patient.	Period.	Total Acetone in Milligrammes.	Result of Rothera Test.
R	8 a.m.–8 a.m. Starvation "A" ..	18·0	–
	8 a.m.–12 noon. Starvation "B" ..	11·0	+
	12 noon–8 a.m. Ordinary diet "C"	28·0	+
	Total	57·0	
R	8 a.m.–8 a.m. Starvation "A" ..	16·4	–
	3 p.m. Rectal glucose, 30 grammes in 600 cubic centimetres. Well retained.		
	8 a.m.–12 noon. Starvation "B" ..	14·0	+
	12 noon–8 a.m. Ordinary diet "C"	25·0	+
	Total	55·4	

The question might still be raised as to whether smaller amounts, say 5 grammes, are absorbed, but I would ask you to consider whether such absorption would be of any therapeutic value. First, the energy derived from 5 grammes of glucose, that is, 20 calories, would be of doubtful value and, secondly, 5 grammes of glucose would be incapable of preventing the development of even a mild form of ketosis.

In actual practice, post-operative ketosis is of a much severer type than that just now discussed and requires a considerable amount of glucose for its control. Hence I think that it is reasonably safe to state that absorption of glucose from the human rectum is of no therapeutic value.

Acknowledgements.

In conclusion, I should like to state that many of the experiments on human subjects have demanded a most carefully controlled dietary *régime*, and I feel that such work could not have been carried out without the skilled assistance of the dietetic department of the Alfred Hospital. To Sister Bradshaw and her staff I acknowledge my appreciation.

References.

(1) C. Lovatt Evans, Chiao Tsai and F. G. Young: "The Behaviour of Liver Glycogen in Experimental Animals", *Journal of Physiology*, Volume LXXIII, September, 1931, page 31.

(2) G. Bergmark: *"Untersuchungen über die Ausnutzung rektal und intravenös eingeführten Traubenzucker"*, *Skandinavisches Archiv für Physiologie*, Volume XXXII, 1915, page 344.

(3) R. W. McNealy and J. D. Willems: "The Absorption of Glucose from the Colon", *Surgery, Gynecology and Obstetrics*, Volume XLIX, December, 1929, page 794.

(4) H. P. Himsworth: "Dietetic Factors Influencing the Glucose Tolerance and the Activity of Insulin", *Journal of Physiology*, Volume LXXXI, March, 1934, page 29.

(5) R. S. Hubbard: "Determination of the Acetone Bodies in Urine", *Journal of Biological Chemistry*, Volume XLIX, 1921, page 357.

THE QUANTITATIVE EFFECT OF X RAYS ON MITOSIS IN THE MOUSE TUMOUR S-37.[1]

By WM. H. LOVE, B.Sc., Ph.D.,
Sydney.

THE work to be described in this paper is a further contribution to a general study commenced some years ago in l'Institut du Radium, Paris.

Experiments and Results.

In each experiment six tumours were selected in accordance with a technique previously described.(1)(2)(3)(4) Three were irradiated by a measured dose of X rays, the remaining three serving as controls. Care was taken to protect the body of the mouse from the rays, so that the tumours only were irradiated. The irradiations were made with a Coolidge tube excited by a Gaiffe-Gallot Pilon constant potential generator, operating at 100 kilovolts;[2] the beam was filtered by 3·0 millimetres of aluminium *plus* 0·25 millimetre of copper, and the dose in *R* units was measured with a Solomon ionometer.

Two hours after the termination of the irradiation the treated and control animals were killed, small pieces of the tumours were cut into thin sections, stained, and examined microscopically for mitotic content. The number of dividing cells in 200 different fields was enumerated for each tumour and the mitotic survival, which is defined as the percentage number of mitoses that survive a given dose of X rays, was thereby established for each dosage.

The results of the research are shown in Table I and are represented graphically in Figure I.

TABLE I.

Dose in *R* Units.	Number of Dividing Cells in 200 Fields.	Mitotic Survival.
		%
	240	
100	173	72
200	86	36
300	53	22
400	38	16
500	34	14

The general shape of this survival curve is similar to that obtained for the rat sarcoma of Jensen and the mouse carcinoma M-63. The main point of interest is associated with the marked flattening of the curve for doses greater than about 250 *R* units. As previously pointed out, the inhibition of a few more mitoses, on this portion of the curve, demands a relatively large increase of dosage, and it follows that, so far as the inhibition of mitosis in this tumour is concerned, the use of large doses is

[1] This work was carried out under the control of the Cancer Research Committee of the University of Sydney and with the aid of the Cancer Research and Treatment Fund.

[2] Measured by spark gap between 10 centimetre spheres and corrected for temperature and pressure.

ILLUSTRATIONS TO THE ARTICLE BY DR. F. L. GILL.

FIGURE VI.

FIGURE VII.

FIGURE VIII.

FIGURE IX.

FIGURE X.

FIGURE XI.

ILLUSTRATIONS TO THE ARTICLE BY Dr. F. L. GILL.

Figure XII.

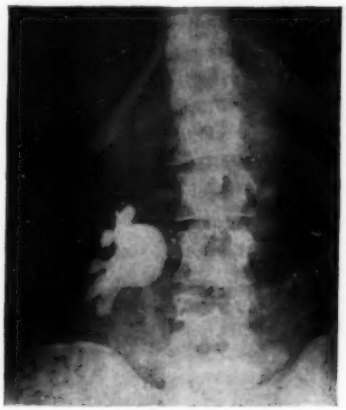

Figure XIII.

Figure XIV.

Figure XV.

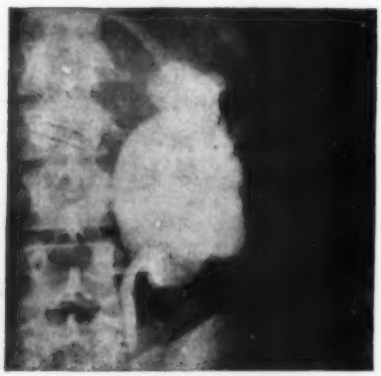

Figure XVI.

Figure XVII.

relatively uneconomic. The importance of extending this type of investigation to human tumours is at once apparent.

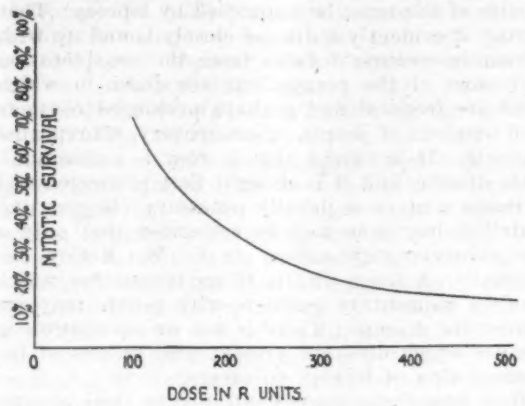

FIGURE I.

Acknowledgements.

I am indebted to Dr. W. Moppett, Department of Cancer Research, for supplying me with the strain of mouse tumour employed in these experiments. The tumour was originally supplied by Dr. Murray, of the Imperial Cancer Research Fund, London.

References.

(1) Wm. H. Love: "The Mitotic Activity of Normal and Malignant Tissues and its Modification by X-Rays", *Journal and Proceedings of the Royal Society of New South Wales*, Volume LXVI, 1932, page 56.
(2) Wm. H. Love: *"Sur une relation entre la fréquence des divisions cellulaires et la vitesse de croissance in vivo du sarcome de Jensen, chez le rat"*, *Comptes rendus des Séances de la Société de Biologie*, Volume CVI, 1931, page 708.
(3) Wm. H. Love: *"Diminution du nombre des mitoses du sarcome de Jensen, provoquée par les rayons X"*, *Comptes rendus des Séances de la Société de Biologie*, Volume CVII, 1931, page 1042.
(4) Wm. H. Love: "The Quantitative Effect of X Rays on Mitosis in the Mouse Carcinoma (M 63)", THE MEDICAL JOURNAL OF AUSTRALIA, July 15, 1933, page 70.

OCCUPATION AND LEPROSY.

By JAMES ROSS INNES, M.D. (Edinburgh), D.T.M. (Liverpool),
Medical Superintendent, N. M. Wadia Hospital, Poona, Visiting Medical Officer, Kondhwa Leper Hospital, Poona, India.

THE occupations and the related facts of caste were studied in 190 cases of leprosy under the writer's care in Poona district. Certain facts emerge which may be of interest to Australian practitioners, seeing that this part of India is comparable in climate with part of Queensland, and that leprosy forms a problem common to both countries. The cases occurred in Poona district, in an area of 5,349 square miles, lying between latitudes 17° and 19° north. The population of the area is just over one million, and it contains the large city of Poona, with a population of 200,000. According to Choksy, 1930,[1] the incidence of leprosy in Poona district is 73·8 per 100,000, but the present author's experience of the district since 1929 leads him to estimate the incidence as between 257 and 321 per 100,000. Most of the cases of leprosy are quite uncontrolled, owing to public apathy and lack of finance.

Caste and Leprosy.

Grouping of cases according to caste is a natural and necessary procedure in India, for caste is the most powerful form of social restriction which obtains in the world.

A caste is a collection of families or groups of families bearing a common name, which name usually denotes, or is associated with, a common occupation. A member of the large circle denoted by the common name of the caste is invariably prohibited from marrying outside that circle, but within the circle there is often a number of smaller circles, to each of which the same prohibition applies.

It will be seen that the keynote of caste is occupation, or at least was so originally. Nowadays a man may not follow the occupation of his caste, so that in the main we can use caste for our present purpose as an indication of social level and social origins, and are compelled to consider actual occupations of the lepers as in Table I.

TABLE I.
Caste Incidence of Leprosy in 190 Cases.

Group.	Number of Cases.	Percentage.
High castes..	11	5·78
Middle castes	31	16·31
Lower castes	72	37·89
Outcastes	59	31·05
Outside communities	17	8·94

In Table I the Indian system has been simplified by expressing the caste groupings in the form of high, middle, low and outcaste groups, which represent a descending grade of social status and standard of living. It will be seen that the lower castes and the long-degraded outcastes together have the heaviest incidence of leprosy, their figures together being 68·94% of the total, whereas the high and middle castes together account for 22·1% only. This means that those who have the lowest standard of living and are lowest in the social order are those with the highest incidence of leprosy. This result is in interesting contrast to the experience in more fully civilized countries, such as the United States of America, where R. Hopkins and O. E. Denney[2] found in their study of 700 cases that: "The social status of the patients is a cross-section of the normal populace as regards education, wealth and culture." In semi-civilized India there are too many powerful factors operating against such an even distribution, including factors of great susceptibility in certain classes of people. The lower castes and the outcastes lead such a dyshygienic and disease-ridden life that it is not sur-

prising to find them prominent in these leprosy figures. On the other hand, some of the high caste people lead such an intelligent and cleanly life that their low incidence of leprosy seems a due reward. It was a striking fact that some of the few high caste patients were leading in some form or other a low caste life.

The outside communities listed comprise minor classes, such as the Mohammedans and the Beni-Israel, who, being of different religion, are outside the Hindu caste system. They had a low incidence, in conformity with their small numbers. It is noteworthy in passing that the Beni-Israel are of Hebrew origin, and the author has met only one case of leprosy in this people.

Leprosy then is found to be chiefly a disease of the lower classes, but it is also found among the wealthy if they are not leading healthy lives and are tempted to self-indulgence.

TABLE II.

Occupations of 190 Lepers.

Occupations.	Numbers and Totals.
No occupation:	
Adults	2 } 17
Minors	15 }
Agriculture:	
Field or farm labour	23
Farmers, small holding	3 } 36
Minors in field work	1 }
Shopkeeping:	
Potatoes	1
Hardware	2
Oil	5
Cloth	3
Sweets	2
Groceries	2 } 26
Clothing	1
Tailoring	4
Grain	2
Liquor	1
Restaurant	3
Transport:	
Railway carriage cleaner	1
Railway ticket collector	1
Railway station coolies	4
Motor bus driver	3 } 12
"Tanga" (public horse vehicle) drivers	2
Chauffeur	1
Education:	
Primary school teachers	2
Primary school pupils	2 } 13
College students	9
Domestic:	
Housewives	19 } 26
Domestic servants	7 }
Coolies:	
General	8 } 10
Road	2 }
Millworkers	15
Clerks	3
Priests	2
Seamstresses	4
Stonemasons	2
Shepherds	3
Carpenters	2
Prostitutes	3
Sepoys	2
Mendicants	4
Fishermen	2
Butcher	1
Gardener in private house	1
Leatherworker	1
Itinerant shoemaker	1
Biblewoman	1
Racecourse syce	1
Salt-worker	1
Basket-worker	1
Potter	1
Dispenser in chemist's shop	1
Village watchman	1
Weaver	1
Milkwoman	1
Grand total	190

Occupation and Leprosy.

The perusal of Table II shows the great variety of occupations represented, and suggests that few aspects of life must be untouched by leprosy. That leprosy is evidently a disease closely bound up with human intercourse follows from the consideration that most of the occupations are those in which there are frequent and perhaps prolonged contacts with numbers of people, or momentary, oft-repeated contacts. It is agreed that leprosy is a communicable disease, and it is thought that prolonged and intimate contact is usually necessary (Rogers and Muir[3]), but it is well to remember that only a few contacts may suffice, as G. W. McCoy has shown.[4] A leper who is in an occupation which involves momentary contacts with people may yet convey the disease. There is not an occupation in the list which does not present possibilities of the transmission of leprosy to others.

How long these lepers continued in their occupations before coming under control is of importance. It is possible to give figures which indicate this (Table III).

TABLE III.

Duration of Disease in 190 Cases from Onset to the Time of Coming under Control.

Period.	Percentage of Cases.
4 years	11
11 to 20 years	37
Over 20 years	15

Most patients have spent their time as lepers, when not under control, in pursuit of their occupations, at least for a proportion of the time. This state of things is due to the peculiar nature of leprosy, in which, as Ernest Muir[5] so well points out: "The condition may be compared with that in an advanced case of tuberculosis, in which the tuberculin reaction is negative; only, while such a tubercular patient is in a highly toxic condition and appears extremely ill, the leprosy patient shows few or no signs of toxicity, can go about his work in good health, and may even show but few clinical signs." Again, says Muir,[6] a leprosy patient: "may do a strenuous day's work without undue fatigue".

Occupational Groups in Relation to Danger of Acquiring Leprosy.

It may be helpful now to consider certain of the occupational groups in relation to occupational danger of acquiring leprosy and similar danger of spreading it.

No Occupation.—There were two adults in the table, supported in a state of idleness and laziness for years by doting parents. The depression in health and morale resulting from lack of employment is a fact of modern experience, well attested, for example, by a survey of 1,000 families unemployed for four years in the United States of America.[7] Higher sickness rates were obtained,

particularly in the more serious illnesses. The element of laziness present in both our lepers is considered by Muir a definite predisposing cause of leprosy.[8] Unemployment is a state liable to predispose to leprosy in a leper country, and an unemployment register is a valuable means of seeking out existing cases. The wandering unemployed man, if a leper, is in a strong position for spreading the disease.

Agriculture.—One would expect those engaged in agricultural pursuits to be resistant to leprosy, thinking, as one does, of open-air work, good food, and an adequate return from the soil. Alas, only too often here in India is the farmer crippled by poverty, poor soil, inadequate acreage, overcrowding, insanitation, intercurrent disease, such as malaria and guinea-worm, and, above all, defective diet. It may not have been agriculture, but the dreadful conditions of it, that led to there being 30 agricultural lepers in our list of 190. Again, with farming at its best, a leper would not have a striking opportunity of passing on the disease, but overcrowded, ill-fed, poverty-stricken farm workers have in fact a good chance of transmitting the disease if they are lepers. There are over 102 million people engaged in agriculture in India, according to the latest census,[9] and if only the conditions of it were improved, we should strike a severe blow at leprosy in India.

Shopkeeping.—Shopkeeping seems definitely to expose a person to the danger of acquiring leprosy. It was arresting to find 26 shopkeepers on our list of 190 lepers. The outstanding features of shopkeeping in India are long hours of attendance, sedentary life, long exposure to dust and flies, insanitary premises, frequent contacts with many people, among whom there may be lepers. Also, a leper who is a shopkeeper has undoubtedly special opportunities of spreading the disease. A factor of importance is that beggars, including leper beggars, are in the habit of making rounds of the shopkeepers to gain alms. Among the shops represented, tailoring shops, liquor shops and restaurants strike one as those most likely to be fertile sources of infection if the shopkeeper or shop servant is a leper. Any public health scheme for the control of leprosy would necessarily include a thorough survey of small shopkeepers. As far as Australia is concerned, Cilento and North[10] attribute the introduction of leprosy to the Chinese through the aborigines; and one reflects that the Chinese are apparently great spreaders of leprosy, and also great shopkeepers.

Transport Occupations.—Persons engaged in transport occupations in a leprosy country are in danger, chiefly because of numerous contacts with the public, and, on the other hand, are dangerous to the public if lepers. In our list there were six persons connected with the railways. The strategic position for the spread of leprosy of a leper ticket-collector is obvious. One is not surprised at a railway carriage cleaner being a victim of leprosy. It is a notorious fact that lepers travel on trains, and they can leave their rags, discharges and bacilli behind them, with which it is the unenviable lot of the cleaner to deal. The third class on trains is usually very crowded, and leper passengers are seldom evicted or asked to pay their fare, which encourages them to travel; withal they are restless people and fond of wandering.

The tanga driver is the driver of the common public horse vehicle. He sits in the front seat and the passengers in the rear seat, facing backwards, and this form of transport is cheap and much used. Driver and passenger seated back-to-back are actually in very close proximity and may turn round to speak and perhaps breathe on each other. Tanga drivers have a habit of curling up to sleep in the passenger seat when a slack hour comes, which is not a pleasant thing to contemplate when a tanga driver can be a leper.

Educational Occupations.—Here we have the factor of prime importance that young people and lepers may be brought into intimate contact, and the susceptibility of the young to leprosy is well recognized. The dangers associated with a leper school teacher must be very great, while leprosy can spread from an infected child to a clean child.

Domestic Occupations.—Domestic occupations fall into two classes, housewives whose entire world is the home, and domestic servants of both sexes in the houses of Europeans and richer Indians. One would not expect women staying at home to run much danger of acquiring leprosy, but there were 19 housewives in the series — not a great number in comparison with the total number, but sufficiently arresting. It was found that in each of these cases a household infection already existed, so that a home life is no protection from the danger of leprosy if there is a leper in it, as also McCoy and Goodhue found in Hawaii.[11] Conversely, a housewife who is a leper has special opportunity of transmitting the disease, particularly to the young. Domestic servants are not specially placed in danger, and there are factors which militate against it, such as the better housing, food and living conditions generally which they obtain, compared with those of their own homes. The importance of domestic conditions is that a leprous servant entering a household where there are young European children is a grave danger.

Mill Workers.—Mill labour is new to India, and the operatives are drawn from people of other types, such as redundant farm workers. They are thus in a state of transition and adaptation to a new order of life, and vulnerable accordingly to the attacks of disease. Muir and Santra[12] found in their valuable survey of Indian conditions in 1932 that people in a state of transition were more susceptible to leprosy. Many mill workers know overcrowding in their villages, but in Bombay tenements they meet worse conditions; they have promiscuous and unhygienic ways of living before they come to Bombay; in Bombay they stand to learn worse. They come into contact with a vastly greater

number of people than they would in their villages, and possibly the change of climate from the Deccan to the humid coast may play some part in lowering health and resistance. Finally, even with steady wages, they may not necessarily purchase a better diet. Adulteration of food in Bombay is scandalously common. In the course of her researches on tropical macrocytic anæmia, Lucy Wills,[13] in 1934, found, from a dietetic survey of the classes which include mill workers, "a deplorable state of multiple deficiencies". It seems clear that mill workers are hardly in a strong position as regards leprosy.

Mendicants.—Among the remaining occupations listed, mendicants may be selected for a final word. Mendicants are numerous, and in India are as a class leprous, uncontrolled, wandering foci of infection. In Calcutta, for example, it is estimated that there are about 4,000 beggars, and of these, 224 are known to be lepers.[14] Further, a leper may become a mendicant and wander from temple to temple in the hope of cure. Near any famous shrine, and in the pilgrim companies on the way to it, and in the streets of our cities one may pick out leper beggars at any time. The control of this nuisance has hardly begun.

Summary.

1. In a study of 190 cases of leprosy in Poona district, the lower castes and outcastes were found to have the heaviest incidence represented.

2. A table of occupations shows a great variety represented, with a predominance of those in agriculture, shopkeeping, transport, education, domestic work and mill labour.

3. It is inferred that leprosy is a disease closely bound up with human intercourse.

4. It is suggested that in addition to prolonged contact, oft-repeated momentary contacts with lepers may be sufficient to convey the disease.

5. It is pointed out that, because of the nature of the disease, lepers often continue in their occupations for long periods.

6. Certain occupations are discussed in relation to the acquisition and spread of leprosy, from which emerge points useful in any scheme for the control of the disease.

References.

(1) Nasarvanji Choksy: *Leprosy in India*, April, 1930, page 41.
(2) R. Hopkins and O. E. Denney: "Leprosy in the United States: A Statistical Study of Seven Hundred Cases in the National Leprosarium", *The Journal of the American Medical Association*, Volume XCII, January 19, 1929, page 191.
(3) Rogers and Muir: "Leprosy", 1925, page 66 *et sequentes*.
(4) G. W. McCoy: "A Statistical Study of Leprosy in Hawaii", "Public Health Bulletin", No. 66, September, 1914, page 22.
(5) Ernest Muir: *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Volume XXIX, Number 5, February, 1936, page 547.
(6) E. Muir: "Juvenile Leprosy", *International Journal of Leprosy*, Volume IV, Number 1, 1936, page 45.
(7) Annual Report for 1933 of the Surgeon-General of the Public Health Service of the United States. Reviewed in *The British Medical Journal*, August 18, 1934, page 313.
(8) E. Muir: "Leprosy, Diagnosis, Treatment, Prevention", Fifth Edition, page 20.
(9) East India Census, 1931. Abstract of tables, page 12. His Majesty's Stationery Office, 1932.
(10) R. W. Cilento and E. A. North: "Human and Murine Leprosy in Tropical Australia: Preliminary Notes and Observations", THE MEDICAL JOURNAL OF AUSTRALIA, December 19, 1931, page 767.
(11) McCoy and Goodhue, quoted by Rogers and Muir: "Leprosy", 1925, page 80.
(12) E. Muir and I. Santra: "Sample Surveys of Leprosy in India", *Indian Journal of Medical Research*, Volume XX, October, 1932, page 421.
(13) Lucy Wills: *The British Medical Journal*, June 2, 1934, page 1002.
(14) Symposium on Leper Beggars in Calcutta, *Leprosy in India*, July, 1933, page 155.

INCREASE IN DIAMETER OF THE AORTA WITH AGE.

By J. BURTON CLELAND, M.D.,
Marks Professor of Pathology, University of Adelaide; Honorary Pathologist, Adelaide Hospital.

THE majority of *post mortem* examinations are made upon persons in the later years of life. It has often struck me when doing a *post mortem* examination on young persons, say in their twenties or thirties, that the diameter of the aorta is definitely less than that in older persons. It was therefore determined that measurements should be taken of the diameter of the aorta just above the aortic valve and again an inch or so above the diaphragm, to see whether there was any regular increase in size with age.

Dr. Birch, of the Mental Hospital, kindly turned for us graduated metal cylinders over which a ring cut from the aorta could be slipped. This enabled the measurements to be taken rapidly and accurately.

An interesting feature, even in some of the aortas of advanced life, was the elasticity presented by them, so that the ring could be readily stretched on the cylinder and would spring back when the pressure was released.

The accompanying tables show, in males and females respectively, that there is a definite and regular increase in diameter of the aorta with advancing years. The results are tabulated in decades. The aortas in 227 males and in 147 females have now been measured and tabulated.

Unfortunately we are unable to correlate these measurements with the weight and height of the individuals. The coffin measurements are usually

TABLE I.
Showing Measurements of Aorta in Males.

Age in Years.	Number of Cases.	Average in Centimetres above the Valve.	Average in Centimeters above the Diaphragm.
Under 21	10	1·7	1·2
21 to 30	10	1·82	1·36
31 to 40	22	2·05	1·39
41 to 50	32	2·21	1·6
51 to 60	55	2·39	1·7
61 to 70	47	2·5	1·75
71 to 80	42	2·75	1·92
81 and over ..	9	3·15	2·22
Total ..	227		

TABLE II.
Showing Measurements of Aorta in Females.

Age in Years.	Number of Cases.	Average in Centimetres above the Valve.	Average in Centimetres above the Diaphragm.
Under 21	7	1·6	1·14
21 to 30	9	1·78	1·22
31 to 40	21	1·86	1·34
41 to 50	32	2·0	1·4
51 to 60	29	2·32	1·53
61 to 70	29	2·32	1·62
71 to 80	18	2·53	1·76
81 and over ..	2	2·6	1·85
Total	147		

recorded by us, and give a rough idea of the height of the deceased, but the bodies are not weighed. However, this factor will operate at all adult ages, and evidently, if the additional data were available, the inference that the aorta gradually dilates more as years advance would still be justified.

As supplementary to the tables, the following data may be mentioned under the various age groups.

Measurements of the Aorta Above the Valve.

Under 20 Years of Age.—The aorta above the valve measured 1·7 centimetres in a boy of 13; 1·75 centimetres in a boy of 15; 2·0 centimetres in a boy of 16; and in another boy of 16, 1·6 centimetres. The smallest diameter was that in a lad of 20, with 1·4 centimetres.

In girls, the aorta of one child of 12 had a diameter of 1·3 centimetres; another of 12, 1·5 centimetres; a girl of 14, 1·4 centimetres.

Age 21 to 30 Years.—The lowest figures in males were 1·5 centimetres in a man of 26; 1·6 centimetres in a man of 28. The highest figure was 2·2 centimetres in a man of 27.

In women, one of 26 had a diameter of 1·6 centimetres, and three had diameters of 1·7 centimetres. The highest figures were 2·0 centimetres in two women, aged 29 and 30.

Age 31 to 40 Years.—The lowest figures in males were 1·6 centimetres, 1·7 centimetres and 1·75 centimetres. The highest figures were 2·9 centimetres in a male of 40, and 2·5 centimetres in males of 32 and 40.

In women the lowest figures were 1·5 centimetres, 1·6 centimetres and 1·7 centimetres (four cases). The highest figures were 2·2 centimetres in a woman of 38, and 2·1 centimetres in a woman of 33.

Age 41 to 50 Years.—The lowest figures for males were 1·6 centimetres in a man of 42, 1·7 centimetres in a man of 42, 1·8 centimetres in a man of 43, and 1·9 centimetres in a man of 47, five out of the 32 cases being under 2·0 centimetres. The highest figures were 2·8 centimetres in a man of 47, and 2·75 centimetres in a man of 48.

In women, the lowest figures were 1·5 centimetres in a woman of 47, 1·55 centimetres in a woman of 45, 1·6 centimetres in five cases, 13 of the 32 cases being under 2·0 centimetres. The highest figures were 2·8 centimetres in women of 47 and 50, and 2·6 centimetres in two cases.

Age 51 to 60 Years.—The lowest figures in males were 2·0 centimetres in five cases and 2·1 centimetres in eight cases, all the 56 cases being 2·0 centimetres or over. The highest figures were 3·1 centimetres in a man of 54, 2·9 centimetres in a man of 60, and 2·8 centimetres in two cases.

In women, the lowest figures were 1·8 centimetres in women of 53 and 55, and 1·9 centimetres in a woman of 60, only three of the 29 cases being under 2·0 centimetres. The highest figures were 3·3 centimetres in a woman of 54, 3·0 centimetres in a woman of 58, and 2·8 centimetres in three cases.

Age 61 to 70 Years.—The lowest figures in males were 1·8 centimetres in a man of 62, 1·9 centimetres in a man of 65, and 2·0 centimetres in a man of 65, only two cases being under 2·0 centimetres out of a total of 48. The highest figures were 3·9 centimetres in a man of 67, 3·1 centimetres in a man of 67, 3·0 centimetres in men of 66 and 67, and 2·9 centimetres in three cases.

In women, the lowest figures were 1·7 centimetres in women of 62 and 64, 1·8 centimetres in a woman of 61, 1·9 centimetres in two women aged 66, and 2·0 centimetres in a woman of 64, five out of the 29 cases being under 2·0 centimetres. The highest figures were 2·7 centimetres in women aged 70, 69 and 65, and 2·6 centimetres in five cases.

Age 71 to 80 Years.—The lowest figures in males were 2·1 centimetres in a man of 72, 2·2 centimetres in a man of 72, and 2·3 centimetres in men of 71 and 80, none of the 42 cases being 2·0 or under 2·0 centimetres. The highest figures were 3·8 centimetres in a man of 80, 3·5 centimetres in a man of 80, 3·4 centimetres in a man of 74, 10 of the 42 cases being 3·0 centimetres or over.

In women the lowest figures were 1·8 centimetres in a woman of 74, 2·2 centimetres in women of 73 and 76, only one of the 18 being under 2·0 centimetres. The highest figures were 3·3 centimetres in a woman of 77, 3·0 centimetres in a woman of 70, 2·9 centimetres in a woman of 79, two only of the 18 cases being 3·0 centimetres or over.

Age 81 Years and Over.—The lowest figures in males were 2·2 centimetres in a man of 84, 2·7 centimetres in a man of 81. The highest figures were 4·8 centimetres in a man of 82, and 3·65 centimetres in a man of 85.

Only two women over 80 are included, one of 82 showing a diameter of 2·5 centimetres, and one of 87, 2·7 centimetres.

Measurements of the Aorta Above the Diaphragm.

Under 20 Years.—In males the lowest figures were 1·1 centimetres in boys of 13, 14, 16 and 19. The highest figures were 1·35 centimetres in a boy of 15, and 1·3 centimetres in lads of 19 and 20. The variation was from 1·1 to 1·35 centimetres.

In girls, the lowest was 1·0 centimetre in girls of 12, 14 and 19. The highest was 1·5 centimetres in a girl of 20. The variation was from 1·0 to 1·5 centimetres.

Age 21 to 30 Years.—The lowest figures in males were 1·1 centimetres in a man of 26, and 1·2 centimetres in men of 22 and 23. The highest figures were 1·7 centimetres in a man of 22, and 1·6 centimetres in a man of 27. The variation was from 1·1 to 1·7 centimetres.

In women, the lowest figures were 1·0 centimetre in a woman of 30, and 1·1 centimetres in a woman of 28. The highest figure was 1·4 centimetres in a woman of 29. The variation was from 1·0 to 1·4 centimetres.

Age 31 to 40 Years.—The lowest figures in males were 1·1 centimetres in a man of 39, and 1·2 centimetres in men of 32 and 35. The highest figures were 1·8 centimetres in a man of 40, 1·6 centimetres in a man of 39. The variation was from 1·1 to 1·8 centimetres.

In women, the lowest figures were 1·2 centimetres in women of 32, 34, 34, 35, 36 and 39. The highest figures were 1·6 centimetres in a woman of 37, and 1·5 centimetres in women of 33, 38 and 40. The variation was from 1·2 to 1·6 centimetres.

Age 41 to 50 Years.—The lowest figures in males were 1·5 centimetres in a man of 42, 1·4 centimetres in six cases. The highest figures were 2·1 centimetres in a man of 47, 1·9 centimetres in men of 47 and 48, and 1·8 centimetres in a man of 42. The variation was from 1·1 to 2·1 centimetres.

In women, the lowest figures were 1·2 centimetres in women of 42, 44 and 47, and 1·25 centimetres in women of 44 and 47. The highest figures were 1·9 centimetres in a woman of 49, 1·7 centimetres in women of 45 and 49. The variation was from 1·2 to 1·9 centimetres.

Age 51 to 60 Years.—The lowest figures in males were 1·4 centimetres in men of 54 and 55, and 1·5 centimetres in six cases, the oldest aged 60. The highest figures were

2·2 centimetres in a man of 57, 2·1 centimetres in men of 57 and 59; five cases were 2·0 centimetres or over. The variation was from 1·4 to 2·2 centimetres.

In women, the lowest figures were 1·1 centimetres in a woman of 57, 1·2 centimetres in women of 51, 53 and 55. The highest figures were 2·0 centimetres in a woman of 58, and 1·9 centimetres in a woman of 58. The variation was from 1·1 to 2·0 centimetres.

Age 61 to 70 Years.—The lowest figures in males were 1·4 centimetres in men of 62, 62 and 66, and 1·5 centimetres in men of 63, 65 and 65. The highest figures were 2·2 centimetres in a man of 67, 2·1 centimetres in men of 67 and 68; seven of the 47 cases were 2·0 centimetres or over. The variation was from 1·4 to 2·2 centimetres.

In women, the lowest figures were 1·3 centimetres in a woman of 65, 1·4 centimetres in women of 62, 62 and 67. The highest figures were 2·0 centimetres in a woman of 68, 1·69 centimetres in a woman of 62; only one case out of 29 was 2·0 centimetres or over. The variation was from 1·3 to 2·0 centimetres.

Age 71 to 80 Years.—The lowest figures in males were 1·4 centimetres in a man of 72, 1·6 centimetres in a man of 72, and 1·7 centimetres in four cases. The highest figures were 2·6 centimetres in a man of 80, and 2·5 centimetres in men of 80 and 73; 19 of the 43 cases were 2·0 centimetres or over. The variation was from 1·4 to 2·6 centimetres.

In women, the lowest figures were 1·3 centimetres in a woman of 74, 1·5 centimetres in women of 73 and 74. The highest figure was 2·1 centimetres in a woman of 78; four of the 18 cases were 2·0 centimetres or over. The variation was from 1·3 to 2·1 centimetres.

Age 81 Years and Over.—The lowest figures in males were 1·6 centimetres in a man of 84, and 2·0 centimetres in three cases; only one of the nine cases was under 2·0 centimetres. The highest figures were 3·6 centimetres in a man of 82, and 2·3 centimetres in two cases; only one case of the nine was over 3·0 centimetres. The variation was from 1·6 to 3·6 centimetres.

There were only two women over 80, one of 82 showing a diameter of 1·8 centimetres and the other, of 87, 1·9 centimetres.

Reports of Cases.

WHOOPING COUGH ECLAMPSIA WITH RECOVERY.

By MICHAEL KELLY, M.B., B.S. (Adelaide),
Bunbury, Western Australia.

D.G., an undernourished child, aged nine years, was seen on April 25, 1933. She was suffering from whooping cough of one week's duration. Two brothers, aged four and a half and twelve years, were suffering from whooping cough complicated by bronchopneumonia. On May 3 I saw the child again. She was suffering from bronchopneumonia, with signs at both bases, and a temperature of 38·9° C. (102° F.). Her condition steadily improved until May 10, when her temperature was normal and the lungs were clear.

That evening, at 8 p.m., she had a right-side convulsion with spasm of the glottis. She immediately became unconscious, and generalized choreiform movements commenced and continued for thirty-six hours without intermission. During the whole of this time she did not cease to emit loud grunts and groans, which could be heard fifty yards away. Her eyes were wide open and stared straight in front of her, while her face twitched continuously and her body and limbs writhed in the semi-purposive movements characteristic of chorea. Forceful restraint was necessary for more than twenty-four hours. No intelligible sound was made, the grunts resembling those of a savage pig. The temperature was 40° to 40·2° C. (104° to 105° F.).

Sedative treatment was employed and the patient became quieter on the evening of May 11, when 7·2 grammes (120 grains) of bromide had been given. When seen at 8 a.m. on May 12 she was rational, though extremely ill from exhaustion, with a high temperature and profound toxæmia. No neurological signs were detected at this stage, though lumbar puncture was not performed.

The patient remained very ill for a fortnight, and it was thought that she could not recover. Signs of consolidation developed at the right apex, and later signs of fluid at the right base. The temperature remained continuously high and the toxæmia severe. The paroxysmal cough, which on May 10 had nearly disappeared, reappeared with increased severity. The temperature began to fall by lysis on May 29 and she finally made a complete recovery. She was discharged from hospital on June 26, 1933.

W. G. Wyllie opened a discussion upon encephalitis at the annual meeting of the British Medical Association at Bournemouth in 1934. His address is printed in *The British Medical Journal* of August 11, 1934, page 241.

In this article he refers to whooping cough encephalitis and quotes authorities who state that whooping cough is followed by encephalitis less frequently than any other acute infectious disease, with the exception of mumps.

The nervous symptoms, he says, are often delayed until the cough is nearly gone. The syndrome consists of multiple convulsions, sometimes accompanied by hemiplegia, diplegia, idiocy and blindness. The syndrome he calls whooping cough eclampsia, and he states that most cases are fatal.

Wyllie divides encephalitis associated with acute fevers into two classes: (i) toxic, characterized by congestion and œdema of the brain; and (ii) demyelinating encephalitis. The former type is characteristic of whooping cough, while the second type is seen after vaccination, measles and chickenpox. Wyllie regards the toxic type as a reaction to bacterial toxins rather than the result of a microbic invasion. It seems that the above is a case of whooping cough eclampsia of lessened severity, followed by complete recovery.

INTUSSUSCEPTION IN AN ADULT.

By ARCHIE ASPINALL, M.B., Ch.M. (Sydney), F.R.A.C.S.,
Honorary Surgeon, Sydney Hospital; Lecturer in Clinical Surgery, Sydney Hospital.

IN May, 1935, an obese patient, aged fifty-two years, was admitted to Sydney Hospital suffering from chronic bronchitis and complaining of continuous epigastric pain of two weeks' duration. Beyond slight tenderness over McBurney's point, examination of the abdomen revealed no abnormality. X ray examination revealed a pathological appendix. Under local anæsthesia a long chronically inflamed appendix was removed. Many adhesions were found between parietal peritoneum, caecum, omentum and small intestine. Convalescence was uneventful.

On May 18, 1936, the patient was readmitted to hospital complaining of a nagging abdominal pain, most severe in the left hypochondrium, since October 13, 1935. He had taken Epsom salt and his bowels had acted several times. He had noticed a streak of blood in the stool on one occasion.

At 2 p.m. severe pain began all over the abdomen and, running up into the chest, was intermittent in character. The patient did not vomit, but complained of a feeling of nausea. He had a chronic cough. No urinary symptoms were present.

He stated that he had colicky pain of a similar nature when he was about nine years of age, and suffered from chronic bronchitis. He had been operated on for hæmorrhoids, and for *fistula-in-ano* and hernia in 1922, and had a fractured skull, fractured sternum and fractured vertebræ in 1920.

On examination the patient was very obese and looked ill; he had obvious abdominal discomfort. His tongue

was moist and coated. His temperature was 36·4° C. (97·5° F.), his pulse rate was 85, and his respirations were 18 in the minute. His abdomen moved evenly on respiration. Some distension was present and slight generalized tenderness was noted on palpation. The tenderness was more marked over the site of the appendicectomy scar near the right antero-superior spine, where an indefinite mass was palpable. Examination *per rectum* revealed no abnormality. Nothing abnormal was detected in the urine.

On October 19, 1935, an enema of milk and molasses was returned slightly blood-stained. A diagnosis of partial intestinal obstruction was made and operation was decided on.

Under ether given by the open method a right lower paramedian incision was made. An œdematous mass of omentum was found in the right iliac fossa adherent to the abdominal wall. This was separated and the small bowel was found to be distended, and a mass could be felt at the ileo-caecal junction. The mass proved to be an ileo-colic intussusception. The caecum was œdematous and difficulty was experienced in effecting reduction, but gentle manipulation was successful following the application of warm pads. The apex was at a point in the ileum 15·0 centimetres (six inches) from the ileo-caecal valve. At this situation a tumour about the size of a large cherry within the bowel was felt. The peritoneal layer of the ileum showed old scarring. A longitudinal incision was made into the bowel and the broad pedicle of the tumour was clamped and tied off and the tumour was removed. The incision in the bowel was closed in layers with plain catgut and a small drainage tube inserted into the ileum 30·0 centimetres (twelve inches) above the site of the tumour; it was fixed by a fine catgut suture and a purse-string suture of fine chromicized gut. The tube was passed through a small opening in the omentum and brought out through the abdominal wall through a small stab wound and fixed to the skin. The abdominal wound was closed in layers with plain catgut.

On October 20, 1935, the enterostomy tube was draining freely and the patient took fluids well. On October 30, 1935, the drainage tube was removed. The bowels were acting normally. On November 7, 1935, the wounds were healed.

Convalescence was uneventful. Some weeks later an abscess developed under the skin at the site of the stab wound, but rapidly healed after incision.

Pathological Report.

On macroscopic examination the specimen weighed seven grammes. On section it appeared to consist of a central portion of adipose tissue and connective tissue surrounded by abnormal mucous membrane. The specimen was divided longitudinally. One block, representing a complete slice, was bisected. Subsequently the remaining tissue was cut in different planes from the first portion and then embedded.

On microscopic examination inflammatory changes were conspicuous in the covering mucous membrane and also to some extent throughout the whole specimen. The epithelium showed some reactive over-growth, but there was no evidence of carcinoma. It was rather difficult to pick up anatomical bearings. Dr. Inglis, who made the report, wrote that whether the adipose tissue which was so conspicuous in the central portion of the specimen was lipomatous or portion of fatty tissue which had been invaginated into the specimen was doubtful.

Points of Interest.

The following are the points of interest in this case:

1. Intussusception is not common in adult life.
2. The pain was in the upper part of the abdomen.
3. The bowels acted normally.
4. The bowel was not resected, as the patient's condition was not good and the clinical appearance was not suggestive of malignant disease.
5. The enterostomy opening closed easily.
6. The type of tumour was noteworthy.
7. In spite of chronic bronchitis and obesity, ether was administered by the open method with complete success.

CHOLELITHIASIS AND HYDROPS OF THE GALL-BLADDER IN A CHILD.

By T. J. BIGGS, M.B., Ch.M.,
Honorary Assistant Physician, Mater Misericordiæ Hospital, North Sydney; Honorary Clinical Assistant to Medical Out-Patients' Department, Sydney Hospital.

C.B., a male, aged thirteen years, complained of severe pain over the right hypochondrium, with nausea and vomiting, which had developed suddenly a few hours before I saw him. He had been subject to recurrent similar, though less severe, attacks since he was seven years old. They had been numerous and had lasted a few hours to a few days. The pain was localized to the right upper part of the abdomen and did not radiate; he had noticed his urine was "dark", and his motions were paler with some of the attacks, and his mother had noticed a "yellowish tint" in his skin with some of the attacks. He had suffered from measles when four years old and from mumps at five years, but there was no antecedent history of typhoid fever.

On examination, the boy was intelligent, thin, of sallow complexion, with an anxious expression. The breathing was hurried and accompanied with "a catch", and he was doubled-up in pain. The temperature was 37·2° C. (99° F.), the pulse rate was 120 per minute, and the respiratory rate was 28 per minute. His tongue was furred. There was rigidity of the upper half of the right rectus muscle, while the remaining abdominal muscles were "on guard" to palpation. Diffuse tenderness was present over the right hypochondrium and over the epigastrium. The urine contained much bile. A specimen of fæces could not be obtained. The examination revealed no other abnormalities, and a diagnosis of acute cholecystitis was made. The administration of a hypodermic injection of morphine and atropine, together with the application of a series of hot packs to the upper part of the abdomen, afforded him relief. Reexamination a few hours later, when he was less distressed, showed the point of localized maximum tenderness to be over the site of the gall-bladder; also it was thought that an indefinite mass that moved with respiration could be palpated below the right costal margin.

On the following morning there was an acute exacerbation of the signs and symptoms, and the patient was slightly jaundiced. The temperature was normal and the pulse rate was 110 per minute. He was admitted to hospital, and the abdomen was opened by an upper right rectus incision. The peritoneal cavity was dry, but the gall-bladder presented like a balloon. It was enormously distended and 480 cubic centimetres (sixteen ounces) of bright green bile mixed with mucus were withdrawn from it. It contained no other contents, but there was considerable œdema around the bed of the gall-bladder and in the adjacent tissues. The common bile duct was dilated to about the thickness of the surgeon's thumb, and there was a large, single, dark-coloured, ovoid gall-stone impacted within it.

The calculus measured 3·75 centimetres in its longitudinal diameter and 2·0 centimetres in its transverse diameter. A choledochotomy and cholecystostomy were performed, one tube draining the gall-bladder and a smaller tube draining Rutherford-Morrison's pouch.

The patient made an uninterrupted recovery, the tube being removed from the gall-bladder on the twelfth day.

Comment.

The points of interest in the case are: (*a*) the onset of gall-bladder disease at seven years of age, (*b*) the size of the gall-stone and the accommodating common bile duct at the time of operation when the boy was thirteen years old, (*c*) the great enlargement of the gall-bladder in association with obstruction of the common bile duct by gall-stone which is an exception to Courvoisier's law.

Acknowledgement.

I wish to record my appreciation and thanks to Dr. T. Farranridge who performed the operation in this case.

Reviews.

AN AUTOBIOGRAPHY OF IMPORTANCE.

"THOSE WERE GOOD DAYS" is the cheery title of the autobiography of a famous German surgeon and pathologist, Carl Ludwig Schleich.[1] Over fourteen years have now passed since Schleich died. During that period 365,000 copies of his book in its original form have been sold in Germany, but the English translation (by Bernard Miall) made its appearance only last year. The book is the work of a writer of great originality of expression, and recounts his experiences as a happy boy in the home of his father (an oculist of Stettin) as a carefree, beer-drinking, singing student, and as a great doctor suffering abuse and calumny after his pioneering of local anæsthesia. The whole work is pitched in a key which impresses the lovable personality of the author upon the reader; it has a certain bravado, a swashbuckling verve and fling about it, which is almost reminiscent of Benvenuto Cellini.

Although medicine was in his blood, young Schleich, many-sided as was his intellect, nearly succumbed to the call of music. He was the possessor of a splendid voice, a voice of such quality that a famous German musician begged him to undertake an operatic career. But he was more than a mere singer. With certain congenial friends he worked at the chamber music of Beethoven, Rubenstein, Mendelssohn and Brahms, and played pianoforte quartets and trios with others. From early childhood he dabbled in musical composition, filling countless pages of manuscript books with his tuneful imaginings. In later life, Schleich cast a critical eye upon the immense mass of his jejune compositions, preserved through the years by his proud mother. Out of the stack he approved of one work only—his setting of Goethe's *Meerestille* ("for three young women's voices"), which seemed to have something in it of the breath of the quiet ocean. The rest, he tells us, was nothing but conventional harpings on the fundamental chord, the dominant and the subdominant, with a series of diminished sevenths thrown in to conceal the lack of musical thought. Apart from his musical talent, Schleich was a painter, and, if one illustration in his book can be taken as a fair sample of his work, a painter of merit. But even in matters concerning the pictorial arts, his inventive and original mind was busy with the improvement of the conventional media. He evolved "an oil tempera without the oil", suitable for application to canvas, a somewhat original idea when one recollects that tempera for centuries was considered as an agent suitable only for the decoration of walls, and as a somewhat unreliable and short-lived agent at that.

Schleich's professional career was a strange admixture of success and failure, of obloquy and applause. As a brilliant young graduate, he worked, with Ehrlich as a companion, in the laboratory of the celebrated Virchow, and was assistant to the great surgeon Lagenbeck. The tragedy of Schleich's professional life occurred in 1892, when he announced at a surgical congress his conviction that local anæsthesia offered a safe and reliable method of avoiding the danger of chloroform narcosis. The congress pooh-poohed his discoveries, and he was lampooned and humiliated by his colleagues and by the contemporary Press. Not for ten years, when the famous Mikulicz spoke bravely in his favour, was Schleich's reputation vindicated. But through this period of strain and sorrow Schleich's resilient spirit would not down; he regarded his colleagues' obstinacy and ignorance with kindly pity, and patiently awaited the day of recognition.

Schleich's personal acquaintanceships were vast and varied. No account of his life would be complete without mention of his friendship with Strindberg. Buoyant and virile though Schleich was, he felt a particular attraction for, and a great pride in his very acquaintanceship with, the great Swede. At this period, Strindberg, penniless, half mad and eccentric though he was, bestrode northern Europe like an intellectual colossus. Of him Ibsen had just remarked: "There is one who is greater than I." Those were days of a long-delayed literary renaissance in Sweden, when Selma Lagerlof and Strindberg, who had brought the thing about, were regarded as almost divine. In the streets of Stockholm people doffed their hats and whispered one to the other: "There goes Strindberg!" Schleich fell under the spell of the sombre, brooding genius of the great novelist and playwright, taking pride in the knowledge the friendship brought him of the work of de Maupassant, Nietzsche and Weininger.

All in all, Schleich's autobiography is a notable study of a very notable personality, and presents to us in a manner not soon forgotten a convincing picture of a fertile mind.

[1] "Those Were Good Days: Reminiscences", by C. L. Schleich, translated by B. Miall; 1935. London: George Allen and Unwin, Limited. Demy 8vo, pp. 280, with plates. Price: 12s. 6d. net.

AMŒBIASIS.

IN the preface of his book "Amebiasis and Amebic Dysentery",[1] Professor Charles F. Craig apologizes for its title, remarking that, though amœbic dysentery is merely a symptom complex of amœbiasis, "the term 'amebic dysentery' is so generally thought to indicate a distinct disease and the term 'amebiasis' is so seldom considered by physicians as including amebic dysentery, it was thought best to use both terms in the title of the monograph". Loose thinking on the part of a number of American physicians is not sufficient justification for the use of a title that might lead to confusion. "Amebiasis", even with the elision of a letter, is all that is required. But this book is something more than a treatise on amœbiasis—that is, infection with *Entamœba histolytica*; the various other amœbæ that invade the human intestine are described, and described well.

Professor Craig deals with ætiology, symptomatology, pathology, diagnosis, prognosis and treatment of all the various manifestations of amœbiasis, and he discusses at some length the epidemiology of the disease. Laboratory methods in the examination of the fæces (including artificial culture of amœbæ) are lucidly described, and the various sources of error in laboratory diagnosis are pointed out. Clinical manifestations receive the attention they merit; but the author is careful to point out that "diagnosis cannot be considered as conclusive unless *Endamœba histolytica* has been demonstrated to be present in the stools of the infected individual". The chapter on treatment is adequate; but those with experience of the disease will recognize that treatment is not so easy as a casual perusal of this chapter might suggest.

It is of interest to note that Professor Craig does not believe there are such people as healthy carriers. He believes that *Entamœba histolytica* is always a destroyer of tissue and that an infected person must have lesions. He supports his view with accounts of *post mortem* examinations of carriers who have died of other disorders.

The book is an excellent compilation of what is known of *Entamœba histolytica* and amœbiasis, and is all the more valuable because of the number of Professor Craig's own contributions that it contains. The author makes good use of his extensive experience.

The book is more suitable for the tropical practitioner or the hygienist than for the general practitioner, excepting perhaps the occasional practitioner who is particularly interested in the subject. Anyone with a general interest only in amœbiasis would find that he had to read rather too much to obtain the information that would be of use to him in his practice.

Occasional grammatical errors have crept in; but they are slight and comparatively inoffensive. The book is well printed, on art paper. The numerous illustrations are excellent. The difficulty in making satisfactory photographs of living amœbæ in human fæces must be considerable; the reproductions of photomicrographs in this book are worthy of high praise.

[1] "Amebiasis and Amebic Dysentery", by Charles F. Craig, M.D., M.A., F.A.C.P., F.A.C.S.; 1934. London: Baillière, Tindall and Cox. Royal 8vo, pp. 315, with illustrations. Price: 22s. 6d. net.

The Medical Journal of Australia

SATURDAY, JUNE 13, 1936.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

PEPTIC ULCER AND THE NERVOUS SYSTEM.

THE association between lesions of the central nervous system and changes in the gastric mucosa, sometimes amounting to ulceration, has for many years been recognized. Observations on the subject were recorded as long ago as 1867, and experimental work has been carried out at rare intervals ever since. Interest was reawakened in 1932, when Cushing reported a number of cases in which death following operation on the brain was not due to any direct intracranial complication, but to perforative erosion of the upper part of the digestive tract. Cushing's paper was published in *Surgery, Gynecology and Obstetrics* of July, 1932; and a discussion on his findings will be found in THE MEDICAL JOURNAL OF AUSTRALIA of September 3, 1932, at page 306. Cushing and his fellow workers produced evidence that erosions of the stomach could be brought about by pilocarpine and pituitrin, more particularly when the drugs were introduced into the ventricles of the brain. As an hypothesis the following sequence of events was suggested: stimulation by psychic or other influences of the nuclei in the tuberal region, release of the vagus from sympathetic antagonism, spasm of the stomach muscle, ischæmia of tissue supplied by the small terminal vessels, infarction and, finally, digestion by the hyperacid gastric juice. Stimulated by Cushing's work, A. D. Keller, of the Department of Physiology and Pharmacology of the University of Alabama School of Medicine, has been carrying out experimental investigations on dogs. He publishes three articles, one of them with Marie C. D'Amour.[1]

In the first of his papers Keller makes a preliminary report. He inflicted a series of injuries on the brain stem of dogs and some cats. Apart from purely ventricular involvement, pathological lesions occurred spontaneously only after hypothalamic and pontine lesions had been produced. Hæmorrhagic areas occurred in the mucosa after complete destruction of the anterior portion of the hypothalamus; craters were found only if the anterior portion of the hypothalamus was intact. Keller thinks that the hæmorrhagic states may be precipitated by the activation of the sympathetic outflow (posterior portion of the hypothalamus), and the craters by activation of the parasympathetic outflow (anterior portion of the hypothalamus). It was thought that probably the hæmorrhagic areas were the precursors of the craters. He concludes that the neural mechanism is activated either by alteration in the ventricular cerebro-spinal fluid by contamination with blood and *débris* of the lesion, or by local traumatic effects of the lesions. He points out that the certainty of the latter method is complicated by the fact that the lesions in every instance encroached on the ventricular system. Having reached this stage in his investigations, Keller undertook vagotomy and sympathectomy in a series of animals, in which he also inflicted chiasmal lesions. He concludes that there is no room for doubt that vagotomy does not protect the gastro-intestinal mucosa from the hæmorrhagic states and that sympathectomy does not protect it from crater formation. It is, he thinks, also not a coincidence that no craters were encountered in animals subjected to vagotomy and that no hæmorrhage occurred in the series subjected to sympathectomy.

[1] *Archives of Pathology*, February, 1936.

Therefore he thinks that he is justified in concluding that vagotomy protects the mucosa from crater formation and that sympathectomy protects it from hæmorrhagic states. He adds that if this view be accepted, localized hæmorrhages are not the precursors of craters, and the two conditions, hæmorrhages and craters, are the result of separate and distinct mechanisms. In his third paper (that which he contributes with D'Amour) Keller reports the results of investigations into the possible relationship of a disturbance in the glandular hypophysis to the gastro-intestinal changes. He has studied the gastro-intestinal tract after total and after partial hypophysectomy. The hæmorrhagic states and gastric craters encountered were the same as those which occurred after chiasmal lesions. (Hypoglycæmic crises occurred and were regarded as being due to deprivation of the anterior pole.) The conclusion reached is that ulceration was precipitated, not because of the lack of hypophyseal secretions, but because of neighbouring neural derangement, possibly intraventricular stimulation, as a result of opening the third ventricle during operation.

This recital of Keller's observations does not lead us very far in our search for the cause of peptic ulcer. Still, he may be on the right track; the workers of last century may have seen the truth dimly, and Cushing undoubtedly did a great service when he turned attention again to the nervous system. Keller thinks that central stimulation may be by a chemical or less probably by a mechanical factor. The chemical factor may be either a specific ionic effect produced by increased concentration of a constituent or constituents normally present, or by the presence of foreign constituents, or it may be a general osmotic effect due to a general change in osmotic concentration. Work has recently been done on the relationship of certain chemical substances to the nervous system, and hormonic action has been postulated. Perhaps in the future work of this kind, correlated with investigations like those of Keller, may take us a step nearer to elucidation of the peptic ulcer mystery. In this sphere the physiological chemist would appear to be our main hope.

Current Comment.

HUMAN GLANDERS.

THE causative organism of glanders is *Pfeifferella* (*Bacillus*) *mallei*. Most warm-blooded animals may be infected by the organism, except the ox, pig and white mice. The disease may be transmitted to man from infected equines, and very rarely from infected human clothing. Carnivora contract the disease from eating infected horse flesh, but there are no records of infection conveyed from carnivora to man. Glanders was once very common, but in recent years it has become rare. This is largely due to more thorough veterinary supervision and the systematic use of the Mallein test. Although Australia would appear to be free, in these days of rapid air travel an infected human being from India or the East Indies might readily gain access to the Commonwealth. Professor S. H. Gaiger has described his own experiences as a sufferer from the disease. Infection was sustained during the examination of exudate from a pony in India suffering from glanders. The path of entry of the infection was seemingly the gastro-intestinal canal. The disease lasted well over four years, during which a relapse followed apparent recovery. Gaiger considered that fresh air and sunshine were of the greatest value in treatment. He eventually recovered after numerous operations.

J. F. Burgess observes that G. D. Robins, in 1905, collected reports of 153 cases of human glanders up to that time. Since 1906 Burgess was able to trace 48 reports in the literature.[1] He adds details of a further case occurring in a butcher. He states that glanders is a specific infective and contagious disease, affecting chiefly the horse, mule and ass, and communicable to man. It may be contracted by inhalation, ingestion or direct inoculation of the organism into the skin or mucous membrane. It is termed "glanders" when it leads to a systemic disease, often associated with nasal ulcers and implication of the lungs. When the lesions are limited to the skin it is termed "farcy". Both types may coexist in one subject, and the disease may be acute or chronic. Contact with horses is generally necessary for the occurrence of human glanders. Consequently it is usually an occupational disease, grooms, soldiers, coachmen, horse-trainers, butchers and pathologists being affected. Inquiry should be always directed to nasal discharge, submaxillary enlargements and cervical abscesses in horses in contact with human beings. In man the organism may enter through an abrasion of the skin, with ensuing lymphangitis. Nodules may appear along the course of the lymph vessels or elsewhere. Only rarely do glandular enlargements break down. Frequently mucous membrane, particularly that of the nose, is involved. The conjunctiva has been the point of entry. The site of entry may not be detected and the disease may begin

[1] *The Canadian Medical Association Journal*, March, 1936.

as an acute infection simulating typhoid or rheumatic fever or respiratory disease. Both acute and chronic glanders vary greatly in intensity. The former is almost invariably fatal; in a small proportion of cases of the latter recovery may occur, although the disease may persist for years. Acute exacerbations are noticed in chronic glanders. When the disease enters through the skin the primary lesion is a vesiculo-pustule. When the disease is acute there occur severe inflammation, œdema and necrosis with pyæmia. Generalized eruptions may appear. In chronic cases there is marked infiltration; later, abscesses and ulcers form, and usually there is great destruction of tissue. Metastatic foci occur, especially in subcutaneous and intramuscular tissues. There may be great destruction of bony and soft tissues about the nose, fauces and throat. When joints are involved they may become purulent. The lungs may show a bronchiolitic process or consolidations suggesting tuberculosis or pneumonia. There may be abscesses of the brain with meningitis. The gastro-intestinal tract is rarely affected, but the organism has been found in gastric ulceration.

The incubation period of acute glanders is five to six days; in chronic glanders it may be many weeks. The *Bacillus mallei* should be sought for in discharges from open lesions, but it may be very difficult to demonstrate the organism in chronic glanders. Cultures should be made and pus inoculated intraperitoneally into male guinea-pigs. Strauss's reaction should be looked for. However, other organisms, especially those of the brucella group, may give rise to the Strauss reaction. In horses the Mallein reaction is specific; but in man this test has been used in so few cases that any estimation of its value is difficult. Instances are recorded in which definite cases failed to give the Mallein reaction. This may be due to a very low pathogenicity of some strains of the organism, as its virulence varies greatly. A positive Mallein reaction, according to Burgess, is not an urticarial erythematous lesion, but a cellular and inflammatory response characterized by a local erythematous swelling with œdema and infiltration, lasting forty-eight hours and associated with a systemic reaction and fever. W. W. C. Topley and G. S. Wilson state that the complement fixation test is the most reliable laboratory test. According to Reinhardt, 4% of faulty positive reactions occur in healthy horses, and in 2% of cases no reaction occurs in glandered horses. E. A. Watson found complement fixation specific in a high titre in three proved cases. He has noticed this reaction in occasional normal human sera. The agglutination test is also used, but its value is more doubtful and a precipitin reaction is not considered sufficiently accurate for practical purposes. In glanders a response to the Wassermann test has been reported on several occasions. In the case reported by Burgess there was curious variation in the results of the tests, which were sometimes positive and at others negative. It was considered that the positive reactions were probably the result of non-specific antibodies in the blood stream and not due to syphilis.

Australia has hitherto escaped a visitation of glanders, but there is no certainty that it will always do so. J. Douglas Stewart states that in 1891 some circus horses landed in Australia from America were found to be infected with glanders, but were promptly destroyed without any spread of the disease. An allied disorder is melioidosis due to *Pfeifferella* (*Bacillus*) *whitmori*. This disease occurs in countries adjacent to the Indian Ocean. It resembles glanders and, in man, is generally fatal. It occurs naturally in rodents or in dogs and cats preying on rodents. This disease also may yet invade Australia.

RUPTURE OF THE KIDNEY AFTER PYELOGRAPHY.

PYELOGRAPHY is not the simple and harmless procedure that it may appear to be. Those who are unfamiliar with urological procedures should have attention drawn to a report by L. H. Baretz of three cases of rupture of the kidney following pyelography.[1] Baretz points out that the discovery of pyelovenous backflow by Lee-Brown and Hinman threw considerable light on pyelography. Over-distension of the renal pelvis by pyelographic media will cause intrarenal extravasation, throwing into the venous circulation in infected cases not only the medium, but also pus, blood and micro-organisms. That even with the comparatively safe newer solutions rupture of the kidney is a dangerous complication is shown by Baretz's cases. In the first a calculus was present in a large pyonephrotic sac. The injection of 35 cubic centimetres of "Skiodan" for purposes of retrograde pyelography failed to fill the kidney, though it was sufficient to make a diagnosis. Although further pyelography was contraindicated, 75 cubic centimetres of "Skiodan" were injected, presumably that the full extent of the sac might be determined. The kidney ruptured, and in spite of immediate operation the patient died. In the second case the patient recovered, and Baretz states that if visualization had been essential, the intravenous method should have been used. In the third case 40 cubic centimetres of "Skiodan" were injected and extravasation occurred at the uretero-pelvic junction; the patient recovered. He was suffering from an infection of the renal pelvis, which was subsiding. Baretz admits that the use of the pyelogram in these cases was indiscreet. Obviously the capacity of the renal pelvis should not be exceeded in pyelographic injections. Baretz holds that aspiration of the pelvis should be a routine procedure to determine its capacity. He also believes that if there is no obvious pain after from fifteen to twenty cubic centimetres of the medium have been injected, a pyelogram should be prepared before the injection is continued.

[1] *The Journal of the American Medical Association*, March 21, 1936.

Abstracts from Current Medical Literature.

MORBID ANATOMY.

The Bone Marrow in Agranulocytosis.

R. C. DARLING, F. PARKER AND H. JACKSON, JUNIOR (*The American Journal of Pathology*, January, 1936) have studied the pathological changes in the bone marrow in agranulocytosis. Their study was confined to cases in which sections of the bone marrow were available and in which the clinical manifestations were typical. The series comprised 25 patients (21 females and 4 males), ranging in age from twenty-four to eighty-five years. Twenty-four of the patients died of the disease, and one had a sternal bone marrow biopsy done shortly before both clinical and hæmatological improvement began. In the most acute cases, in which death occurred within four days of clinical onset, the essential lesion consisted in an increase of the very early granular or stem cells and a lack of further maturation. In the group of cases in which death occurred from five to ten days after onset of symptoms, the general finding was that the proportion of stem cells had greatly decreased, while that of the plasma cells and lymphocytes had correspondingly increased. "The fruitless proliferation of stem cells had spread to the normally acellular regions and appeared to have burned itself out in a vain effort to supply to the peripheral blood normal cells of the granular series." In the late cases—those in which the patient died over ten days after the onset—the stem cells were found to have given way very largely to plasma cells, which formed the predominant white cell. In no case were there obvious changes in the red blood cell series or any degenerative changes in the white cells. Examination of the marrow from the sternum of the patient who recovered showed that recovery is characterized by rapid development of the stem cells into myelocytes, metamyelocytes and polymorphonuclear neutrophile cells. The authors state that their findings confirm the view expressed by other authors, that agranulocytosis is due to an arrest of maturation. Agranulocytosis, in their opinion, is probably a disease entity.

Regeneration of the Uterine Mucosa after Abortion.

B. LITWAK AND E. WIKTOROWSKAJA (*Monatsschrift für Geburtshülfe und Gynäkologie*, December, 1935) have, by means of the hysteroscope, observed the regeneration of the uterine mucosa after abortion. The visible changes were controlled by microscopic examination of small pieces of mucosa removed by curettage. Hysteroscopic examination shows that by the fifth day a considerable area has been already covered with fresh epithelium and that this is practically completed by the eighth day. The interior of the uterus is apparently completely covered within eighteen to twenty-one days. The regeneration of the mucosa commences in the deeper, unchanged portions of the glands and mucosa, and is accompanied at first by lymphocytic infiltration of the endometrium.

Cystic Disease of the Human Breast.

C. F. GESCHICKTER AND DEAN LEWIS (*Archives of Surgery*, April, 1936), in the course of a study on the lactogenic substance in the human breast, report an investigation for its presence in cystic disease of the breast. Cystic disease is a relatively common condition in childless women approaching the menopause. In a series of 500 patients studied at the Johns Hopkins Hospital a serous or milky discharge was observed in 3%. At operation or on aspiration these cysts are usually found to contain a cloudy or milk-like fluid. Microscopic examination of the excised mammary tissue surrounding the blue domed cyst reveals pathological changes which may closely resemble those of physiological lactation. The authors have found that cyst fluid and mammary tissue obtained from patients with cystic disease contain œstrogenic and lactogenic substances; the concentration of these substances may be high. The fluid from a single cyst, however, with one exception, was not found to contain both hormones. The authors have found that a milk-like secretion can be obtained by the injection of œstrogenic and lactogenic substances into menstruating women; they therefore think it reasonable to conclude that these hormones are responsible for the pathological secretion of cystic disease. The authors have found lactogenic substance in the mammary tissue of one patient with cystic disease. Since they have obtained this hormone from the mammary tissue of cows, and since they have found œstrogenic substance in the mammary tissue of four patients with cystic disease, they think it reasonable to conclude that the pathological changes observed in the surrounding tissues, as well as the secretory changes in cystic disease, are the result of stimulation by the œstrogenic and lactogenic hormones.

Gastro-Intestinal Function and Localized Ablations of the Cerebral Cortex.

FRED A. METTLER *et alii* (*Archives of Surgery*, April, 1936) have investigated disturbances in gastro-intestinal function after localized ablations of the cerebral cortex. They refer to the work of Keller and others (see the leading article in this issue) and report that by the infliction of lesions in the frontal cortex they have produced in animals ulcer-like erosions of the gastric mucosa. They conclude, however, that ulceration is only one phase of a much more extensive disturbance of the gastro-intestinal tract, due to autonomic imbalance. They have obtained evidence in one animal of a post-operative increase in hydrochloric acid in the gastric juice, and also of stasis. The ulcer-like erosions occurred only when the injuries were of long standing; hyperæmia and congestion are to be expected in animals with more recent damage.

Virus Infection.

F. M. BURNET (*The Journal of Pathology and Bacteriology*, January, 1936) has investigated inapparent (subclinical) infection of the rat with louping ill virus. He finds that after intranasal inoculation in the rat louping ill virus passes readily to the olfactory bulbs. The virus appears to multiply in the olfactory bulbs. After the eighth or ninth day the virus disappears from the olfactory bulbs concomitantly with the appearance of virus-inactivating antibodies in the serum. As a rule no further spread of virus occurs beyond the olfactory bulbs.

F. M. BURNET AND DORA LUSH (*ibidem*, March, 1936) state that, in view of the results obtained with louping ill virus, they have tested several other viruses for their ability to reach the olfactory bulbs of the rat after intranasal instillation. Negative results were obtained with the viruses of poliomyelitis, vaccinia (dermal strain), Newcastle disease of fowls and psittacosis. With the virus of infectious ectromelia of mice, however, positive results were obtained and further investigations were carried out. The authors have found that ectromelia virus inoculated in high concentration intranasally into rats produces foci of infection and multiplies in the olfactory mucosa. In a high proportion of cases small amounts of virus can be detected in the olfactory bulbs. After infection circulating antibodies appear and the rats are resistant to reinfection. In one rat in which the olfactory apparatus was completely undeveloped, no infection occurred. The authors point out that these two investigations may be concerned only with an artificial laboratory phenomenon of no general significance, but that there is sufficient similarity between the two to warrant consideration whether they have any wider biological significance. The nasal mucosa is of all tissues in the body the most exposed to noxious agents suspended in the air; part of its function is to effect a more or less complete removal of particulate matter from inspired air. The nasal mucosa supports the olfactory cells, which are the only nerve cells directly exposed to the outside environment and which are specially

adapted to trap molecular impurities in the air. The authors think that their investigations suggest that certain cells of the nasal mucosa are unduly susceptible to virus attack. It is highly probable that the olfactory cells are more readily entered by a potentially pathogenic virus than are any other cells of the body surface. The absence of virus infection found by the authors in rats with undeveloped olfactory apparatus speaks in favour of the view that it is these cells in which the virus finds an initial foothold. The olfactory system presents a point of weakness in the defences of the body against infection, but it may be justifiably argued that this weakness is converted into a potentially valuable defence. The infection remains relatively localized and yet is sufficient to provoke a definite immunity response. If an effective immunity can in this way be developed after contact with a weakly virulent strain of a given virus, it would almost certainly be effective against a highly virulent strain subsequently encountered.

MORPHOLOGY.

The Conducting System of the Heart.

D. M. BLAIR AND F. DAVIS (*Journal of Anatomy*, April, 1935) have studied the conducting system of the human and bovine hearts with the aid of a pyridine silver histological technique, which emphasized the undoubted muscular nature of both sinu-atrial and atrio-ventricular nodes. The authors note the extent of the sinu-atrial node beyond the customarily recognized limits and discuss its bearing on experimental work in this region of the heart. They describe the connexions of the sinu-atrial nodal fibres with the sinus and atrial musculature and the musculature of the nodal artery and its branches. In the bovine heart the sinu-atrial nodal fibres are continuous with the large "typical" Purkinje fibres, and these in turn with ordinary atrial muscle fibres; the authors point out that this is similar to the condition previously observed in the avian heart. They give a description of the structure of the atrio-ventricular node, of the atrial prolongations of the node, and of the continuity of the nodal fibres with those of the atrial myocardium and of the atrio-ventricular bundle; they also describe the structure of the fibres of the atrio-ventricular bundle and the proximal parts of its limbs. They give the relative sizes of the muscle fibres of the sinu-atrial node, atrio-ventricular bundle, atrial myocardium and ventricular myocardium, and note the general arrangement of nerve cells in relation to the conducting system. There are two types of nerve ending in relation to the conducting system muscle fibres: (i) a fine perifibrillar network, epilemmal in position, and possibly afferent in function, and (ii) a simple filiform ending, hypolemmal in position, somewhat similar to the motor nerve ending of skeletal muscle, which may be the motor nerve ending of the conducting system fibres. The authors demonstrate the presence of nerve fibres with intraprotoplasmic endings in the *tunica media* of branches of the coronary arteries. They also discuss the use of the term Purkinje fibre.

Appendix Vermiformis Duplex.

A. J. E. CAVE (*Journal of Anatomy*, January, 1936) points out that though partial or complete duplicity of the vermiform appendix is an extremely rare condition, it is more frequently met with than total absence of the appendix. Among 4,352 cases examined by various authors, in only one was the appendix absent. Known examples of appendix duplex may be resolved into three types: Type A — single caecum with one appendix exhibiting partial duplicity; Type B — single caecum with two obviously separate appendices (complete duplicity); Type C — duplicity of caecum, each caecum bearing its proper appendix. In the case described by the author the terminal part of the ileum entered the large bowel at the customary angle and the caeco-appendix retained its infantile form. The caecum proper comprised a proximal dilated moiety, succeeded immediately by a constricted conical distal moiety, from the left side of the apex of which a fifteen millimetre long vermiform appendix proceeded infero-medially. This appendix had lost any original mesentery it might have possessed, it communicated freely with the caecal cavity and did not appear to be furnished with a valve of Gerlach. On the postero-medial wall of the proximal caecal segment an orifice, guarded by prominent crescentic folds of mucosa, led into the lumen of a second vermiform appendix. This supernumerary appendix, bound to the caecum by a short mesentery and angulated soon after its commencement, was some twenty millimetres long. It had a calibre at least twice that of the apical appendix, and, save for its tip, was entirely retrocaecal. One of the *tænia coli* could be traced to the roots of both appendices. Both structures manifested normal histological appearances. The specimen was obtained from an otherwise unremarkable full-time fœtus.

Movement of the Wrist Joint.

R. D. WRIGHT (*Journal of Anatomy*, October, 1935) has made a detailed study of the movement of the wrist joint. He has employed three methods of investigation: (*a*) Stereoscopic X ray films of the movements of the living hand were taken. (*b*) Long needles were implanted into the several bones of the forearm and of the proximal and distal bones of the carpus; this allowed observations to be made of the axial movements of bones in a recently dead hand when the wrist was motivated by pulling on appropriate tendons and when the ligaments were still intact. (*c*) A study was made of wrist joints, fixed but lax, which were dissected and arranged to correspond to the disposition of the living bones seen stereoscopically and of the dead bones "seen" by movements of the needles. The author concludes that radial deviation occurs entirely at the transverse carpal joint. Ulnar deviation is almost wholly a sliding movement of the radio-carpal joint. Flexion and extension are compounded of radio-carpal and transverse carpal movements, the latter being more extensive. The navicular bone shows a wide range of movement in relation to the other bones of the proximal carpal row.

An Early Human Embryo.

J. FLORIAN AND J. P. HILL (*Journal of Anatomy*, July, 1935) describe an early human embryo obtained by total uterine extirpation. The specimen comprises the chorionic vesicle with the surrounding vesicle with the surrounding decidua and contained embryo. It is unique in that its connecting stalk is attached to the chorion, not at its deep (basalis) pole, as is normal, but at its superficial pole underlying the *decidua capsularis*. It thus provides an explanation of the polar variety of *insertio velamentosa* of the umbilical cord.

Congenital Heart Disease with Single Arterial Trunk.

G. DAVIDSON (*Journal of Anatomy*, July, 1935) reports a rare case in which there was failure of development of the secondary atrial septum and of the proximal bulbar septum, and in which there was atresia of the pulmonary half of the distal part of the *bulbus arteriosus* and incomplete development of the aortic septum. These defects gave rise to no evidence during life, but death occurred on the fourteenth day from bronchopneumonia.

Variations in the Musculature of the Superior Extremity.

N. PAN (*Journal of Anatomy*, July, 1935) describes a case in which the *pronator quadratus* has an extensive origin from the dorsal border and medial and volar surfaces of the lower fourth of the ulna. Also, in addition to the usual quadrilateral muscle, there is a separate triangular superficial portion overlapping the lower part of the muscle. Both parts are well developed. Also a muscle, the subscapulo-humeralis, in the shoulder region crosses the tendon of the subscapularis.

Special Article.

(Contributed by Request.)

THE NECESSARY EXTENSION OF AN OPERATION: IS IT AN ASSAULT?

BY A BARRISTER-AT-LAW.

"EVERY human being of adult years and sound mind has a right to determine what shall be done with his own body; and a surgeon who performs an operation without his patient's consent commits an assault for which he is liable in damages." This statement, which correctly sets out the common law of England, is from the judgement of Mr. Justice Cordozo, now a member of the United States Supreme Court, in Schloendorff *v.* New York Hospital (1914) 211 N.Y.R. 125.

Every doctor knows he should obtain the patient's consent before an operation. But what is the position if during an operation an extension of that operation is found necessary and there is no opportunity of getting the patient's consent to that extension? Can the doctor safely proceed? Taylor, quoting Stanley B. Atkinson, says: "If during an operation an unforeseen extension is seen to be inevitable proof that such was in the opinion of the surgeon honestly necessary for the life or health of the patient would be sufficient to exonerate him." ("Medical Jurisprudence", Eighth Edition, Volume I, page 93.) This deals with the question from the point of view of negligence, and the other texts do the same. But would the doctor be exonerated from actions of assault as well as from actions of negligence? A case recently decided by the Supreme Court of Nova Scotia has clarified the position.

The case was Marshall *v.* Curry (1933) 3 D.L.R. 260. The plaintiff was a master mariner and the defendant a surgeon of high standing. The action was for negligence and assault in the course of an operation, and ten thousand dollars were claimed as damages. No evidence of negligence having been given, the case was decided solely on the ground of assault.

The plaintiff claimed that in the course of an operation for the cure of a hernia the defendant without his knowledge or consent removed his left testicle. The defendant said that he had to remove the testicle to cure the hernia, that the necessity for its removal could not have been reasonably ascertained before the operation, and that the plaintiff's request to cure the hernia gave implied consent to the removal.

The plaintiff was fifty-two. He had followed the sea since he was sixteen and had never married. About thirty years previously he had fallen from the fore-yard of a barque forty or forty-five feet to the deck. His spine was fractured, with injury to the nerve trunks coming off the spinal cord. Ever since, he had had no sensation in the back of his legs and around the buttocks, and some of the muscles of his feet had been paralysed.

He first consulted the defendant in 1921. The doctor found, besides the conditions mentioned, that his bladder and bowels were paralysed. He had to wear a rubber urinal and had no control over his bowels except when very constipated. His bladder was very septic and the urine contained numerous pus cells and albumin. He had an old compound fracture of one arm and one foot. The doctor treated the bladder and performed a circumcision.

In 1929 the plaintiff sent for the defendant. He was then suffering from fever, headache, dry tongue, discharging sinus and general septic poisoning. His urine was badly infected. He had stones in his bladder and a large stone in his kidney. The doctor drained the bladder and removed the stones. The patient was treated with injections and the condition of the bladder improved. He had a severe pain in his left loin. A few weeks later an abscess formed around a kidney. The doctor operated and found a large abscess in the region of the left kidney, with foul-smelling pus, which he drained. It was not thought advisable to remove the stone. The patient was in hospital six months.

With regard to the pain in his left groin, the plaintiff said: "I simply told him (defendant) I wanted the hernia cured. He examined me. He said: 'All right'." The defendant said that the plaintiff had asked him what he thought of the hernia. He had replied that there was a reasonable chance of curing it and that he thought it was a case for the ordinary hernia operation; the abdominal muscles were in a reasonably good condition. During the operation he found the muscles very much weaker than he had expected. In opening the inguinal canal the testicle appeared. It was grossly diseased, large, nodular and softened. To cure the hernia it was necessary, he considered, to obliterate the canal completely and remove the testicle. After the operation he cut the testicle in two and found multiple abscesses in it. If it had not been removed it would have been a menace to health and life, it might have become gangrenous, the pus might be absorbed into the circulation and blood poisoning have been set up. A day or two later he told the plaintiff that the testicle had been removed because it might have caused trouble. A month later he removed the stone from the kidney and, the following month, a stone from the back of the penis. The defendant called three doctors. The first said there was nothing else to do but what the defendant had done if he wanted to do "good surgery". The second agreed. Of the phrase "good surgery" Chief Justice Chisholm said: "Its use is not helpful; it is general and vague and ambiguous. It may mean good execution by the surgeon and in that meaning it does not touch the question of the surgeon's right to operate." The second doctor was of the opinion that if the testicle had not been removed the plaintiff's life would have been endangered and that the condition of the testicle could not have been ascertained before the operation. The third agreed that the condition could not have been ascertained, and considered the removal necessary to health and, probably, life.

The evidence was held to establish that there was no express consent to the removal, that there was no consent implied in the conversation between the parties before the operation, that the removal was necessary for the health and, in the defendant's view, for the life of the patient.

The general principle of the law is that stated by Mr. Justice Cordozo and set out at the beginning of this article. Had the doctor committed an assault? We have seen that there was no express consent nor any implied in the conversation. Had it been implied in any other way, by, for example, the situation itself, the unexpected discovery of the testicle in its dangerous condition? If not, was there any other legal principle that afforded the doctor protection? These were the questions the court had to answer. Case law was searched for assistance.

Beatty and Cullingworth (60 J.P. 740) was decided in 1896. The defendant doctor was sued for negligence and assault. He had performed a double ovariotomy. The plaintiff had told him that if both ovaries were found to be diseased he must remove neither, as she was going to be married. He replied: "You must leave that to me", or "You may be sure I shall not remove anything I can help". The plaintiff denied having heard this. The defendant and his assistant surgeon said that failure to remove both ovaries would have endangered the plaintiff's health and life. Mr. Justice Hawkins directed the jury in these words: "If a medical man with a desire to do his best for the patient undertakes an operation, I should think it is a humane thing for him to do everything in his power to remove the mischief, provided he has no definite instructions not to operate. There was here no question as to the propriety of the operation, and the defendant always told the plaintiff she must give him a free hand. If you think tacit consent was given you must find for the defendant." The jury found for the defendant. The ground of their finding, however, may have been that tacit consent was given. Since this would be implied from the plaintiff's failure to reply to the defendant's

statement that he must have a free hand and, as we have seen, it was found in our case that consent was not implied in the conversation, the case cannot be said to afford much assistance.

In 1899 came Parnell *v.* Springle (5 Rev de Jur 74). This was a Quebec case. The plaintiff was suffering from some derangement of the womb. The defendant advised a minor operation, to which she consented. After the abdomen had been opened it was discovered that her case was much more serious; the ovaries were honeycombed with sacs of pus and the tubes were clogged with matter in a state of putrefaction. This state was discovered by the bursting of one of the tubes. The defendant and the three other surgeons present agreed that it was absolutely necessary for the plaintiff's life that the ovaries should be removed at once, and the defendant removed them. The case is obviously of striking similarity to the one with which we are dealing. Consent had been given to a certain operation, and an extension of that operation was necessary to the health and life of the patient. It was held that the doctor was not merely justified, that is, immune from an action, in removing the ovaries, but that he was bound to remove them; in other words, would have rendered himself liable to an action if he had not removed them.

In 1905, Mohr *v.* Williams (95 Minn. 261) was heard by an American court. The plaintiff consented to an operation upon her right ear. When she was "under", the defendant examined the left ear and found it in greater need of operation than the right. He operated upon it instead of upon the right. The plaintiff sued for assault and won. It must be assumed, however, as the Chief Justice pointed out, "that the condition of the plaintiff's left ear was not considered to be of so serious a character as to cause immediate danger to her life or health and that there was reasonable opportunity of obtaining her consent to the operation upon the left ear". These assumptions distinguish the case from ours. The Chief Justice proceeded: "Where consent to a certain operation has been given, and in the operation serious conditions, not to be anticipated, are discovered, endangering the life or health of the patient, the surgeon is justified in extending the operation to remove such conditions." It will be noted that the principle is not as high as that of Parnell *v.* Springle, *supra*. The doctor is justified in acting, but is under no duty to act. Later, however, as will be seen, the Chief Justice adopts the higher principle.

Pratt *v.* Davis [(1906) 224. Ill 300] was another American case. The plaintiff had long been subject to epileptic seizures. The defendant found her uterus contracted and lacerated, and the lower part of the rectum diseased. He operated. She left the hospital and was taken back a few months later at the request of her husband. The doctor, without obtaining her consent or that of her husband, operated again and removed her ovaries and uterus. The patient before long became insane. She sued for assault and obtained judgement. The fact that on the second occasion the doctor had no permission to operate at all removes the case from our category. The operation was from its inception unauthorized. Marshall *v.* Curry was a case of unauthorized extension of an authorized operation—a very different matter. Pratt *v.* Davis is helpful, however, for the following statement by Chief Justice Scott: "Where unexpected conditions develop or are discovered in the course of an operation it is the duty of the surgeon in dealing with these conditions to act on his own discretion, making the highest use of his skill and ability to meet the exigencies which confront him, and in the nature of things he must frequently do this without consultation or conference with anyone, except perhaps the members of his profession who are assisting him." It will be seen that the principle is the same as in Parnell *v.* Springle, namely, duty. The Chief Justice's statement is, however, *obiter*, that is, not necessary to the decision and not legally binding.

Bennan *v.* Parsonnet [(1912) 83 N.J. Law 20] was a New Jersey case. The plaintiff asked the defendant to operate upon a rupture in his left groin, which two years earlier had been operated upon by another doctor. Assisting surgeons anæsthetized him, and when the defendant entered the theatre directed his attention to a rupture in the right groin. This rupture was more serious than the other and likely to cause death should strangulation occur, which was not feared in the other rupture. The doctor operated upon the more serious rupture. The facts are, of course, very similar to those of Mohr *v.* Williams, *supra*, with the important difference that here the operation was far more urgent. The plaintiff sued for assault and obtained a verdict. His success was short-lived, however. The Appeal Court set aside the verdict as being against the weight of evidence. The case is memorable for setting up a new principle, namely, that the doctor is the patient's representative to give consent.

Mr. Justice Garrison, having referred to the common law rule as to the necessity of consent, goes on: "But it is also true that the introduction of anæsthesia into the practice of surgery has modified the application of the common law rule in certain fundamental respects of which the law must take notice. Anæsthesia renders the patient unable to consent at the very time that the rule of the common law required that his consent be obtained. To meet this fundamental change of the condition of the patient it is imperative that the law shall in his interest raise up someone to act for him, in a word, to represent him in those matters affecting his welfare concerning which he cannot act for himself because of a condition that has become an essential part of the operation. The conclusion reached is that when a person has selected a surgeon to operate upon him and has appointed no other person to represent him during unconsciousness, such surgeon will be implied by law to be his representative. By virtue of this representation the doctor cannot operate upon the patient against his will or by subterfuge or perform any operation of a sort different from that to which he had consented or that involved risks and results of a kind not contemplated. No amount of professional skill can justify the substitution of the will of the surgeon for that of the patient."

British courts do not accept this principle, and in Marshall *v.* Curry the Chief Justice remarks of it: "There is unreality about that view. The idea of appointing such a representation, the necessity for it, the existence of a condition calling for a different operation, are entirely absent from the minds of both patient and surgeon. The will of the patient is not exercised upon the point. There is, in reality, no such appointment." Which is, of course, adopting a strictly legal point of view; but what other can a court of law adopt?

In Rolater *v.* Strain [(1913) 39 Okla 572] the plaintiff, a young woman, stepped upon a nail, which penetrated a great toe, and inflammation set in. The wound not healing, the defendant advised an operation, making an incision in the foot or toe so as to drain off the joint and remove any foreign matter. The plaintiff consented on condition that no bone be removed. A sesamoid bone was removed. This was, of course, directly contrary to the patient's express wishes, and one is not surprised that she won her action for assault. The fact that the removal of the bone was for her benefit and was expertly done did not affect the matter. As Mr. Justice Garrison said in Bennan *v.* Parsonnet, *supra*: "No amount of professional skill can justify the substitution of the will of the surgeon for that of the patient."

Caron *v.* Gagnon [(1930) 68 Que, S.C. 155] was another Quebec case. The plaintiff's wife had consulted the defendant, who advised curettage. The operation was successfully performed. Some time later she was rushed to hospital with acute appendicitis. The husband, on learning that an immediate operation was necessary, said: "Well, if she must be operated on, I want her to be operated upon at once and for all." During the operation the doctor found that the ovaries were badly diseased and in such a condition that they would have to be removed within a short time. Other doctors supported this. The ovaries were accordingly removed. The circumstances of their removal are obviously very like those of the removal

of the testicle in Marshall *v.* Curry. It should be noted that in Caron *v.* Gagnon it was not the patient who was suing, but the patient's husband, and that there was evidence of consent. Apart from the question of consent, however, it was held that the defendant was not liable in view of the condition of the ovaries and the fact that their removal was for the patient's benefit. The full report is not available and no statement of principle can be given.

After consideration of these cases and due deliberation the court in the case of Marshall *v.* Curry came to this conclusion: "Where a great emergency which could not be anticipated arises, it is the surgeon's duty to act in order to save the life or preserve the health of the patient, and in the honest execution of that duty he should not be exposed to legal liability." In other words, it adopted the principle, not of mere justification, but of duty: the doctor was held bound to act. The question of consent becomes irrelevant. The Chief Justice put the matter this way: "In these cases it is not useful to strain the law by establishing consent by fictions—by basing consent on things that do not exist. Is it not better to decide boldly that apart from any consent the conditions discovered make it imperative on the part of the surgeon to operate, and, if he performs the duty skilfully and with due prudence, that no action will lie against him for doing so?" And: "It is, I think, more in conformity with the facts and with reason to put a surgeon's justification in such cases on the higher ground of duty." It does seem sound reasoning. The old rule of the necessity of consent is then dispensed with in these cases. The defendant was adjudged not liable, despite the absence of express and possibly of implied consent. There is another principle that affords the doctor protection and at the same time, as has been shown, imposes upon him an obligation, the principle of duty. In the writer's opinion this principle is sound, works to the advantage of both patient and doctor, and should, and in time will, be adopted throughout the Empire.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held at the Austin Hospital, Heidelberg, on April 15, 1936. The meeting took the form of a series of clinical demonstrations.

Thoracoplasty in Pulmonary Tuberculosis.

DR. HUGH C. TRUMBLE discussed the part played by the surgeon in the treatment of pulmonary tuberculosis. He pointed out that in certain cases, comprising a small percentage of the total number of phthisical patients, there came a time when, in consideration of the local condition, it became highly desirable that the affected lung should be made to collapse although the induction of artificial pneumothorax was impossible. Selection of suitable cases was difficult, but was of the greatest importance, because the operations performed under unsuitable conditions were attended by disastrous results. The general health of a selected patient should be such that he could be expected to withstand the strain of the two or three major operations at intervals of two to four weeks; the cardiovascular system should be efficient and there should be no other serious systemic disease. The presence of tuberculous foci in organs other than the respiratory system would, as a rule, contraindicate operative interference. Locally, in the thorax, the tuberculous process should be limited to one lung, or at least the other lung should be practically clear. The more acute exudative forms were quite unsuitable for this operation, which should be limited to the treatment of the chronic forms of tuberculosis only. Fibrosis and contraction of the affected lung, as indicated by displacement of the trachea and mediastinum to that side and cavitation, indicated that collapse of the affected area would probably be beneficial. Often it was sufficiently obvious that Nature's attempts at collapse and immobilization of the diseased lung had reached the limit and that without further aid the patient was doomed to die within a comparatively brief time. Dr. Trumble explained that if artificial pneumothorax could not be induced, surgery was necessary and should not be deferred too long; paravertebral thoracoplasty was the most generally applicable procedure to bring about permanent collapse. Usually this was performed in stages, never more than four ribs being excised at one sitting. Usually good lengths of the upper eleven ribs were excised, but occasionally a thoracoplasty limited to the upper four, five, six or seven ribs was sufficient. Dr. Trumble said that he usually employed local anæsthesia with the assistance of light chloroform anæsthesia, but gas was a very satisfactory substitute. Patients usually came through the operation very well. The greatest danger was that of spread of the disease to the other lung in the months succeeding the completion of the operations; but of late years, with better selection of patients, Dr. Trumble had not observed this complication frequently.

Dr. Trumble showed several patients who had received great benefit from surgical collapse; some of them were able to resume their former occupations and were free from any signs of active disease. He also showed a specimen of the thoracic viscera of a patient who died some months after the performance of a thoracoplasty. The lung on the side of the operation was reduced to about the size of a small hand and contained no cavity or obvious air spaces. Death in this case was due to the spreading of the disease to the other lung. Dr. Trumble also demonstrated the instruments that he employed in these operations, and a large series of skiagrams.

DR. J. BELL FERGUSON demonstrated several cases showing the results of thoracoplasty performed by Dr. Hugh Trumble on several patients. He also discussed the indications and contraindications for thoracoplasty, illustrating his remarks with radiographs.

In discussing the indications, he said that the character of the disease was more important than the extent and the presence of cavities, especially cavities with apical adhesions when artificial pneumothorax was affecting only the good lower lobes.

Thoracoplasty should be considered: (i) in every unilateral chronic case occurring in patients up to the age of forty-five years in which collapse could not be produced by other means; (ii) in every unilateral chronic case with cavities having thick and rigid walls; (iii) in cases with controllable hæmoptysis, even if disease was present in the opposite lung, but not in the presence of cavitation in the opposite lung; (iv) very exceptionally in earlier exudative unilateral cases, for example, when artificial pneumothorax could not be carried out owing to location of patients.

Contraindications depended chiefly on the contralateral lung in which diseases other than tuberculosis were present, for example, bronchitis, emphysema, asthmatical symptoms, basal congestion or any pleural changes. Tachycardia, cyanosis, dyspnœa were very important contraindications if due to myocardial failure. If they were due to displacement of the mediastinum from fibrotic traction, however, thoracoplasty was likely to give relief. Established tuberculous enteritis was a contraindication, and fever only if of long standing and with marked remissions.

Phrenic avulsion was useful only if an apical thoracoplasty was done. In a complete thoracoplasty Sauerbruch claimed that the resection of the tenth and eleventh ribs broke the lower thoracic arch and allowed the diaphragm to relax just as avulsion did.

Tuberculous Glandular Masses.

DR. J. F. CHAMBERS showed a male patient, twenty years of age, who, over a period of three years, had developed successively a series of large, almost discrete, glandular masses in the left side of the neck, the right side of the

neck and in both axillæ, giving the clinical impression of Hodgkin's disease. The glands had been shown by biopsy from a number of the regions to be tuberculous, and this view was supported by radiographic evidence of healed lesions in the apices of the lung. Dr. Chambers commented on the rarity with which tuberculous disease was manifested as four separate masses of this nature in different areas, and stated that the masses were becoming smaller as the result of ultra-violet light therapy.

Polyserositis.

Dr. Chambers also showed a female patient, forty-one years of age, who, on January 31, 1933, was admitted to hospital, having suffered for one month from dyspnœa and pain of the pleural type. It was seen in the skiagram that the mediastinum was displaced to the right, with extensive fibrosis and pleural effusion on that side; the presence of a neoplasm was suspected; the pleural fluid was drained off repeatedly. A little later, ascitic fluid began to accumulate rapidly, and on 120 occasions some had been withdrawn during the next two years. The pleural fluid and the ascitic fluid were both albuminous and contained polymorphonuclear and endothelial cells.

On May 13, 1935, when Dr. E. T. Cato performed laparotomy, the liver capsule was greatly thickened and densely adherent to the diaphragm, and the spleen had the appearance of a small, hard, fibrous nodule; the right ovary was removed on account of the presence of multiple cysts, a tag of omentum was placed outside the peritoneum, and the wound was closed. The patient returned to work shortly afterwards; no recurrence of thoracic or abdominal effusion had occurred and she had become practically free from any disability. Dr. Chambers took the view that some inflammatory condition of the serous membranes of unknown causation had resulted, through ultimate fibrotic retraction, in portal obstruction, relief of which was in turn followed by subsidence of the inflammatory state.

An Indolent Form of Carcinoma.

The other patient shown by Dr. Chambers was a female, forty-three years of age, who had come under observation in October, 1932. For the preceding three years a lemon-yellow pallor had been noticed, with increasing weakness, and she had complained of a pain round the lower portion of her back. An abdominal mass, which was regarded as being the spleen, extended downwards nearly to the umbilicus. A hypochromic microcytic anæmia of moderate severity was disclosed on examination of the blood; the bleeding time was five minutes and the coagulation time twelve minutes; the red cells were of normal fragility and the serum failed to yield the Wassermann reaction. At that time a skiagram of the vertebral column was obtained and was regarded as of normal appearance, but, on repetition six months later, a definite metastasis was detected in the third lumbar vertebra. On reinspection of the earlier film a similar appearance was found to have been overlooked, and the opinion was formed that there had been very little extension in the meantime. In searching for a primary growth the results of a barium enema caused doubt to be cast on the sigmoid area, and by sigmoidoscopy an annular constriction was found, firmly incorporated with a fixed uterus, ten centimetres above the anus. The patient had not suffered from any bowel disability. Dr. Chambers said that recently the primary growth had extended and become palpable *per rectum* and ascites had developed, but a recent skiagram, prepared on April 1, 1936, did not show any appreciable change in the appearance of the vertebral metastasis. Dr. Chambers commented on the unusually indolent course of the carcinoma and, apart from the prolonged cachexia, anæmia and possibly sepsis, was unable to afford a satisfactory explanation of the splenic condition.

Cavernous Angioma of the Face.

DR. G. E. FOREMAN showed a male patient, aged sixty-three years, who was admitted to the Austin Hospital in January, 1936, with an enormous pendulous angiomatous mass of the cavernous type, involving the lower lip, both cheeks and the mental and submental regions. He had had from birth an extensive "port-wine stain" extending from the right ear to the right side of the chest and, although the greater part of this had become less obvious ten years earlier, the angiomatous condition had appeared and progressed. Salivation was a troublesome feature and, in spite of good muscular control of the lower lip, saliva overflowed onto the growth; the condition was complicated by the presence of secondary deposits in the cervical glands from a scirrhous epitheliomatous growth involving the right tonsil and the soft palate. The angioma had responded to deep therapy and a second course was in progress.

Genito-Urinary Complications of Spinal Tuberculosis.

Dr. Foreman also showed a male patient, twenty-two years of age, with widespread tuberculosis. In 1931 tuberculous glands were excised from the left side of his neck, and in 1934 the left testis and epididymis were excised. In September, 1934, the scar on the left side of the scrotum was unhealthy and the right epididymis became enlarged. No abnormal appearances were disclosed by a skiagraphic examination of the lung, no tubercle bacilli were found in the urine, and the results of kidney function tests deviated only slightly from the normal. In June, 1935, the right epididymis was removed and was described as being full of tuberculous pus. In October, 1935, a course of injections of tuberculin was commenced. In January, 1936, the patient complained of frequency of micturition. Examination at this time revealed the presence of a large tumour in the right side of the abdomen, which had a rounded lower border and filled the loin; it was firm in consistence and some *ballottement* was possible, but it was not very tender. It had slowly increased in size and the outline could be seen in the skiagram. By rectal examination it could be felt that the vesicles were both enlarged and hard. By the use of "Uroselectan" it was established that the renal excretion was within normal limits, but that the right kidney was displaced outwards. By a skiagraphic investigation of the lumbar spines it was found that a tuberculous process was present which involved the third and fourth lumbar vertebræ, and a calcified collection extended outwards to the left side.

Dr. Foreman said that, although the patient's general condition appeared to be good, his reaction to the *Bacillus tuberculosis* was apparently poor. Several weeks ago the patient had had an attack of pyrexia associated with semi-coma, vomiting and nystagmus. This attack had passed off in a few hours and no abnormal neurological signs were present at the time of the meeting. No active surgical intervention was contemplated.

Excision of the Mandible for Carcinoma of the Cervical Glands.

Dr. Foreman's other patient was a male, sixty-eight years of age, who was admitted to the hospital in March, 1936, because of secondary carcinomatous involvement of the cervical glands. The right half of the mandible had been removed previously at the Royal Prince Alfred Hospital. Dr. Foreman said that he had shown this patient to illustrate the surprisingly small amount of disability which had resulted from the excision of the mandible, and the exceedingly good cosmetic result which had been obtained.

Cavitation in Pulmonary Tuberculosis.

DR. R. D. WRIGHT demonstrated some electrical apparatus which he had designed for the diagnosis of cavities in pulmonary tuberculosis. The difference in the pitch of the breath sounds, which was audible through an ordinary stethoscope, was amplified and thereby made more distinct.

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

McGree, John Allan, M.B., B.S., 1933 (Univ. Sydney), Beach Road, Bateman's Bay.

The undermentioned has been elected a member of the Victorian Branch of the British Medical Association:

Williams, Walter Edward, M.B., B.S., 1928 (Univ. Melbourne), D.L.O.R.C.P. and S. (England), 81, Collins Street, Melbourne, C.1.

NOTICE.

THE Honorary Librarian of the Western Australian Branch of the British Medical Association writes that some errors appeared in the paragraph published in the issue of May 2, 1936, page 623, about journals required in the library of the Branch. Referring to *The British Medical Journal*, line 6 should read: "Volume I, 1892, to Volume I, 1897 (inclusive), and Volume II, 1916, to Volume II, 1925 (inclusive)." The volumes of *The Lancet* which are missing are: Volume I, 1850, to Volume II, 1871 (inclusive), Volume II, 1893, to Volume II, 1895 (inclusive), and Volume II, 1917, to Volume II, 1933 (inclusive).

Hospitals.

PERTH PUBLIC HOSPITAL.

A MEETING of the honorary medical staff of the Perth Public Hospital was held on March 11, 1936, DR. M. B. JOHNSON in the chair.

Cement Dermatitis.

DR. J. E. MCGLASHAN, honorary dermatologist, read a paper on cement dermatitis. He said that he wished to disarm some criticism by stating that his remarks were made with no suggestion that they represented a complete description of cement dermatitis; nor was a survey of the conditions existing outside Western Australia to be attempted. The subject of cement dermatitis during the last few years had occupied a prominent place in compensation medical work in Western Australia. There were several reasons for this: (i) the large increase of the number of cement workers in the State; (ii) the increasing use of cement in building and the exposure to cement among builders and labourers; (iii) *The Workers' Compensation Act*.

There had been considerable controversy in connexion with this matter, and Dr. McGlashan ventured a few remarks with the hope of clarifying the situation to a slight extent.

Cement workers were handling in effect lime and a clay the important constituent of which was silica. As far as his personal experience went, and from his knowledge of industrial medical literature, Dr. McGlashan said that the effects of cement were due to its constituents, and in the main were those due to the caustic alkali-lime. He believed that apart from this cement had no mysterious property of suddenly afflicting workmen right and left.

There were certain stigmata by which workers in cement and lime might be recognized. They were the dry, cracking patches of peeling skin on the hands and wrists, due to the saponification of the epidermal fat, and the subsequent cauterizing of the skin, producing a lime burn. This condition was very likely to affect the peri-ungual regions of the fingers, with deepening of the furrows. The creases of the skin and the hair follicles were early attacked. Lime burns were common on the palms, but apart from this the palms seemed to be immune to irritation.

In uncomplicated cement dermatitis there should be very little disagreement between people who recognized the essential syndrome. It was only after secondary stages with the complications of sepsis and injudicious home treatment that argument arose and became so discursive that the ultimate decision was taken out of the hands of the medical profession and was delivered to the legal profession.

Dr. McGlashan said that he wished to state that true cement dermatitis was a serious disability and difficult to clear up when definitely established. He was not so sure that it was a frequent affliction.

It might sound obvious, but it was well to emphasize that many workers in cement had suffered from various rashes that were not at all incidental to their calling. There was little doubt as to the following points:

1. That cement in its wet form was capable, after long use, of causing some irritation on most skins.

2. That in the healthy skins of healthy people this irritation caused little disability unless complicated by infection or injudicious treatment.

3. That constant immersion in cold cement suspensions caused some weakening of the skin resistance.

4. That some individuals were constitutionally unsuitable for employment in industries involving heat, sweating or immersion in cold water. The more obviously unfit fell in the neurasthenic class and had seborrhœa, pimples, low blood pressure, cold and sweating extremities.

5. That preexisting disabilities and infections definitely lowered resistance and increased the chance of general spread.

At present the industry provided much dispute, litigation and expense, and Dr. McGlashan was afraid that the prestige of the medical profession had not altogether been enhanced by it.

There were a few points that he would endeavour to make on the constructive side, and he wished to suggest some things which might be of use.

1. There should be a medical examination of every workman before he was engaged in the industry, and elimination of: (*a*) the obviously unfit; (*b*) the neurasthenics with cold, sweating extremities, particularly if the pedal extremities were offensive and showed evidence of interdigital fungus infection and lack of personal cleanliness.

2. There should be an insistence on greater cleanliness of factories and employees at the commencement and leaving of work.

3. Was it too Utopian to advocate a pool contributed to by the employer, the insurance company and even by the employee in order to provide a fund by which a workman invalided by his occupation could be helped in the choice and training for a new job without his being driven to litigation for compensation, to neurasthenia, or to plain dishonesty to protect his own and his dependants' future.

4. In view of the number of things that might happen to any workman which were not regarded legally as due to his employment, Dr. McGlashan felt that every man earning an adult wage should be urged to join some benefit society or lodge where sickness and other disability could be fairly adequately provided for, without a first thought as to whether the insurance company would foot the bill.

5. As for the medical profession, Dr. McGlashan urged a scrupulous regard of the probabilities before a man was certified as suffering from cement dermatitis. He had seen syphilis, *lichen planus*, plant dermatitis, ringworm, impetigo, *pityriasis rosea*, all certified as cement dermatitis. Again, a man might be suffering from the aggravating effects of home remedies or septic complications, all of which might be indirectly caused by work. They were legitimate trade accidents, but they should be qualified for what they were and should not be brought forward as cement dermatitis. A wrong diagnosis would in most cases only go towards depriving the incapacitated workman of what legitimate assistance he should have.

6. It was in the interests of the worker, the insurance company, and all concerned in the case that early confirmation of the diagnosis of any industrial skin complaint should be aimed at; so often it was only after weeks of illness, with various forms of treatment, that dispute eventually arose, and a referee endeavoured to make a diagnosis, when history had to be taken into account almost as much as the physical condition. This would not occur if a decision was made immediately on notification as to whether it was or was not acceptable.

In conclusion Dr. McGlashan suggested that medical practitioners should give the worker the liberal benefit of the doubt, but that, if possible, all doubt should be eliminated; if that was not possible, at least the probabilities should be considered. Medical practitioners should remember how seldom it was that anyone but an insured worker complained of cement dermatitis.

Medical Societies.

THE VICTORIAN MEDICAL WOMEN'S SOCIETY.

THE annual meeting of the Victorian Medical Women's Society was held on March 9, 1936.

The following annual report was presented by DR. B. BRUCE SCOTT, the retiring Honorary Secretary.

I HAVE much pleasure in presenting this evening the Honorary Secretary's report for the past year. There have been ten monthly meetings of the Society held during the year, the average attendance of nine of these being 21. Papers of medical interest were read by Dr. Lucy Bryce, Dr. Margaret Anderson, Dr. Mary De Garis, Dr. Ellen Balaam, Dr. Allison Ingram, Dr. Younger-Ross. One meeting was clinical; it was held at the Queen Victoria Hospital, and cases of interest were shown by Dr. Kate Campbell, Dr. Mona Blanch, Dr. Isabel Ireland, Dr. Anne Macleod, Dr. Kate Mackay. Six medical women students were our guests at this meeting.

In September the Victorian Medical Women's Society entertained all overseas and interstate medical women who were visiting Melbourne for the British Medical Association annual meeting. A dinner was held at the Wattle Tea Rooms, the attendance at this function being 121 (72 Victorians, 22 overseas, the rest interstate). As President, Dr. Lucy Bryce received the visitors. After the toast of "The King", Dr. Bryce extended an invitation from the honorary staff of the Queen Victoria Hospital to inspect the hospital during the week, and then called upon Dr. Constance Ellis to propose the toast of the British Medical Association, pointing out that Dr. Ellis had, during the past six years, been the woman nominated by this Society on the British Medical Association Council. The value of her work as one of the pioneer medical women had been most highly appreciated by us all. Following this, Dr. Bryce, in a suitable speech, proposed the health of the guests. This was responded to by Dr. Alice Carleton from Oxford, Dame Constance D'Arcy from Sydney, and Dr. Elizabeth Gunn from New Zealand.

A meeting of the Australian Federation of Medical Women was held on September 10, 1935. All States were represented with the exception of Tasmania and Western Australia. The main business was the decision to affiliate the Australian Federation of Medical Women with the International Federation of Medical Women, and the passing of a motion that one shilling and sixpence from each financial member in each State be sent to the Honorary Secretary as a subscription to the Australian Federation of Medical Women to cover costs of administration and subscriptions to the British and International Federation of Medical Women. The election of office-bearers resulted in Dr. Lucy Bryce assuming the office of President of the Australian Federation of Medical Women in accordance with the constitution. Lady Mackenzie was reelected Honorary Secretary-Treasurer.

At the October meeting, on the retirement of Dr. Ellis, Dr. Jean Greig was elected as the nominee from this Society to the British Medical Association Council for 1936.

It was decided during the year that the Society should have a new constitution, and discussion *re* this took place at a meeting called for February of this year. The extraordinary meeting just held has dealt with this matter further.

Public Health.

REORGANIZATION OF THE INTERNATIONAL LEAGUE AGAINST EPILEPSY.

AT the time of the International Neurological Congress in London a meeting of those particularly interested in epilepsy was held on July 31, 1935, at the Lingfield colony. Thirty-two medical practitioners, representing fourteen countries, were present. After discussion, it was unanimously decided that the International League against Epilepsy should be revived and that immediate efforts should be directed towards the improvement of the social condition and the institutional care of persons with epilepsy. To this end it was agreed that there should be a publication, issued annually or oftener, acquainting readers with facilities and with remedial efforts carried on in various countries. Plans were also laid for a meeting of the League at the time of the next Neurological Congress in Copenhagen.

At an adjourned meeting, held on August 2 (Professor A. Ley, of Brussels, in the chair), the following officers were elected:

President: William G. Lennox, Boston, United States of America.

Secretaries: H. I. Schou, Dianalund, Denmark; L. J. J. Muskens, Amsterdam, Holland.

Treasurer: Tylor Fox, Lingfield, Surrey, England.

All persons interested in improving the condition of epileptics have been invited to join the League. Membership, which includes subscription to the periodical, is the equivalent of five shillings a year or fifteen shillings for the four-year period.

POLIOMYELITIS.

DR. JOHN DALE, Chairman of the Medical Committee Controlling the Poliomyelitis Campaign, Melbourne, has forwarded for publication the following extract from the Epidemiological Report of the Health Section of the League of Nations for October-December, 1935.

Jensen (1935) gives the results of titrations (carried out both at the Statens Serum Institute in Copenhagen and at the Lister Institute in London) of the neutralizing power of sera of paralytic, non-paralytic and abortive cases. The sera of these categories were mixed and the following figures therefore show averages:

Serum from	Protective doses per cubic millimetre
(*a*) Paralytic cases ..	1,000 to 2,000
(*b*) Non-paralytic cases ..	80,000
(*c*) Abortive cases ..	150,000

It is therefore conceivable that the less a patient was apt to produce antibodies, the more serious was the clinical form of the disease.

It is obvious from the titrations of neutralizing power of sera made by Brodie, and more recently by Jensen, showing that convalescents from the abortive form have a serum one hundred times more neutralizing than convalescents from the paralytic form, that it was a mistake to use chiefly the serum of paralytic cases. This discovery is of great practical importance, for it opens the way to procuring a more effective serum much more easily than before, since it can now be obtained from convalescents from abortive attacks, who are much more numerous than paralytic cases and often older.

It is possible that a serum with high neutralizing power so obtained may give therapeutic results superior to those hitherto recorded. There is no doubt that it will give better prophylactic results.

Obituary.

ARTHUR ELLIS BLYTHMAN.

We regret to announce the death of Dr. Arthur Ellis Blythman, which occurred on June 5, 1936, at Kyogle, New South Wales.

STAWELL MEMORIAL FUND.

The undermentioned additional subscriptions have been received for the Stawell Memorial Fund:

£10 10s.: Sir Thomas Dunhill.
£5 5s.: Dr. F. McCallum.
£3 3s.: Dr. J. F. Williams, Dr. G. E. Harper.
£2 2s.: Dr. B. Hiller, Dr. A. W. Shugg, Dr. F. A. Pockley.
£1 1s.: Dr. D. M. McWhae.

Books Received.

SYNOPSIS OF SURGICAL ANATOMY, by Alexander Lee McGregor, M.Ch., F.R.C.S., with a foreword by Sir Harold J. Stiles, K.B.E., F.R.C.S.; Third Edition; 1936. Bristol: John Wright and Sons Limited; London: Simpkin Marshall Limited. Crown 8vo, pp. 681, with illustrations. Price: 17s. 6d. net.

THE TREATMENT OF ASTHMA, by F. T. Harrington, M.R.C.S., L.R.C.P.; 1936. London: H. K. Lewis and Company Limited. Crown 8vo, pp. 121, with illustrations. Price: 6s. net.

MEDICAL MYCOLOGY: FUNGOUS DISEASES OF MEN AND OTHER MAMMALS, by Carroll William Dodge, Ph.D.; 1935. St. Louis: The C. V. Mosby Company; Melbourne: W. Ramsay (Surgical) Proprietary Limited. Super royal 8vo, pp. 900, with illustrations. Price: £3 3s.

Diary for the Month.

JUNE 16.—Tasmanian Branch, B.M.A.: Council.
JUNE 16.—New South Wales Branch, B.M.A.: Ethics Committee.
JUNE 17.—Western Australian Branch, B.M.A.: Branch.
JUNE 18.—New South Wales Branch, B.M.A.: Clinical Meeting.
JUNE 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JUNE 24.—Victorian Branch, B.M.A.: Council.
JUNE 25.—South Australian Branch, B.M.A.: Branch.
JUNE 25.—New South Wales Branch, B.M.A.: Branch.
JUNE 26.—Queensland Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xx, xxi, xxii.

AUSTRALASIAN MASSAGE ASSOCIATION, SYDNEY, NEW SOUTH WALES: Lecturer in Medical Electricity.

FREMANTLE HOSPITAL, FREMANTLE, WESTERN AUSTRALIA: Junior Resident Medical Officer.

HOBART GENERAL HOSPITAL, HOBART, TASMANIA: Surgeon-Superintendent.

PERTH HOSPITAL, PERTH, WESTERN AUSTRALIA: Resident Pathologist and Biochemist.

ROYAL HOSPITAL FOR WOMEN, PADDINGTON, NEW SOUTH WALES: Resident Medical Officers.

ST. GEORGE DISTRICT HOSPITAL, KOGARAH, NEW SOUTH WALES: Honorary Officers.

SYDNEY HOSPITAL, SYDNEY, NEW SOUTH WALES: Junior Pathologist.

THE QUEEN'S (MATERNITY) HOME INCORPORATED, ROSE PARK, SOUTH AUSTRALIA: Resident House Surgeon.

THE PUBLIC SERVICE BOARD, SYDNEY, NEW SOUTH WALES: Junior Resident Medical Officers.

TIBOOBURRA DISTRICT HOSPITAL, TIBOOBURRA, NEW SOUTH WALES: Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor", THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad *per annum* payable in advance.